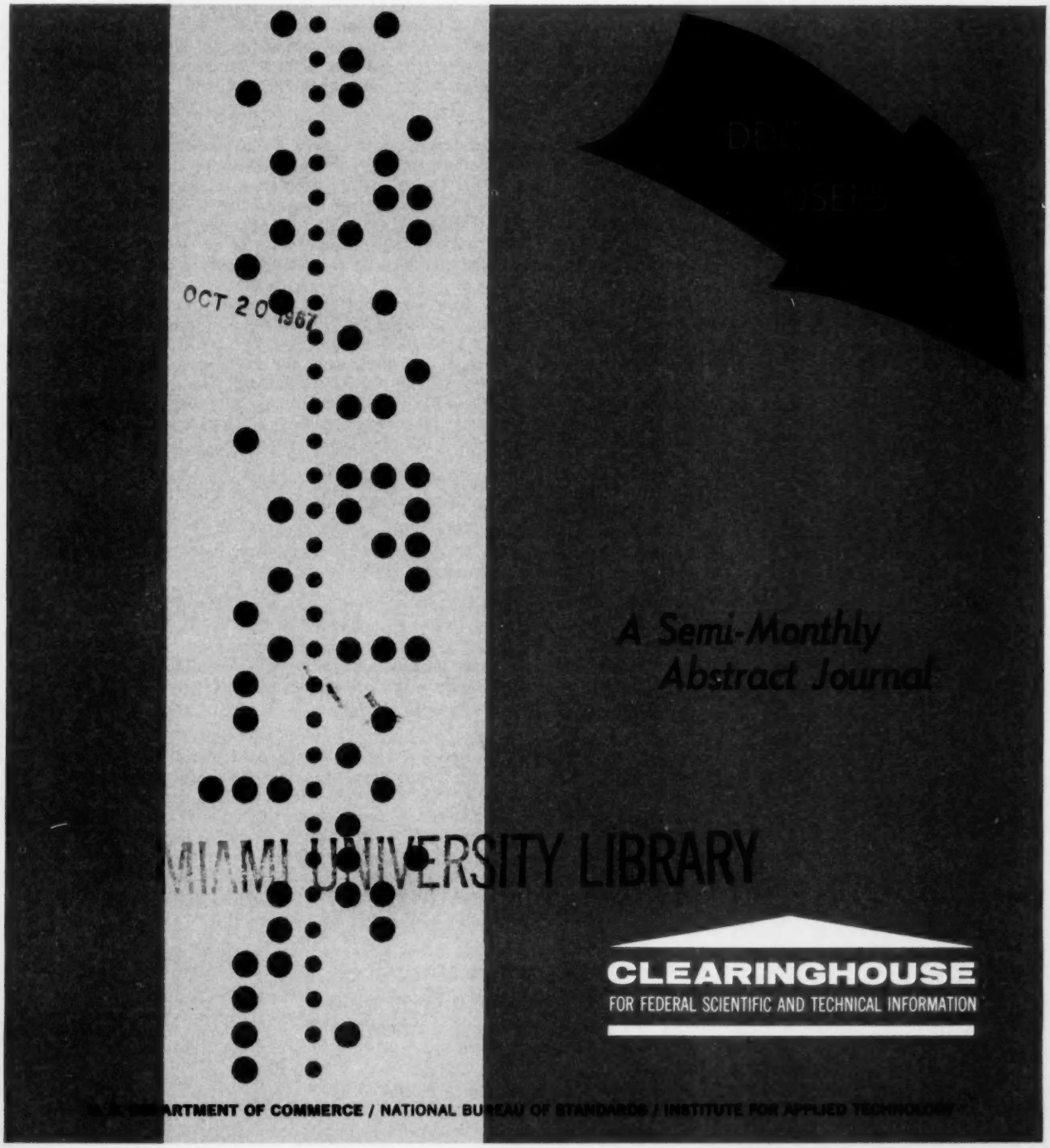
C 41.21 : 67/19

October 10, 1967

U.S. GOVERNMENT

RESEARCH & DEVELOPMENT REPORTS



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A Semi-Monthly Abstract Journal

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U.S. Government **RESEARCH AND DEVELOPMENT REPORTS**

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INDEX

All entries in USGRDR are indexed in the *Government-Wide Index to Federal Research & Development Reports (GWI)* published semi-monthly and sold on subscription by the Clearinghouse at $22.00 a year ($27.50 foreign). Single copy $3.00. Indexing data from current issues of announcement journals of the Atomic Energy Commission, National Aeronautics and Space Administration, and Defense Documentation Center are also included in this index to provide a single reference guide to new unclassified Government-sponsored research and development in the physical sciences, engineering, and related technology.

U.S. DEPARTMENT OF COMMERCE
Alexander B. Trowbridge, Secretary

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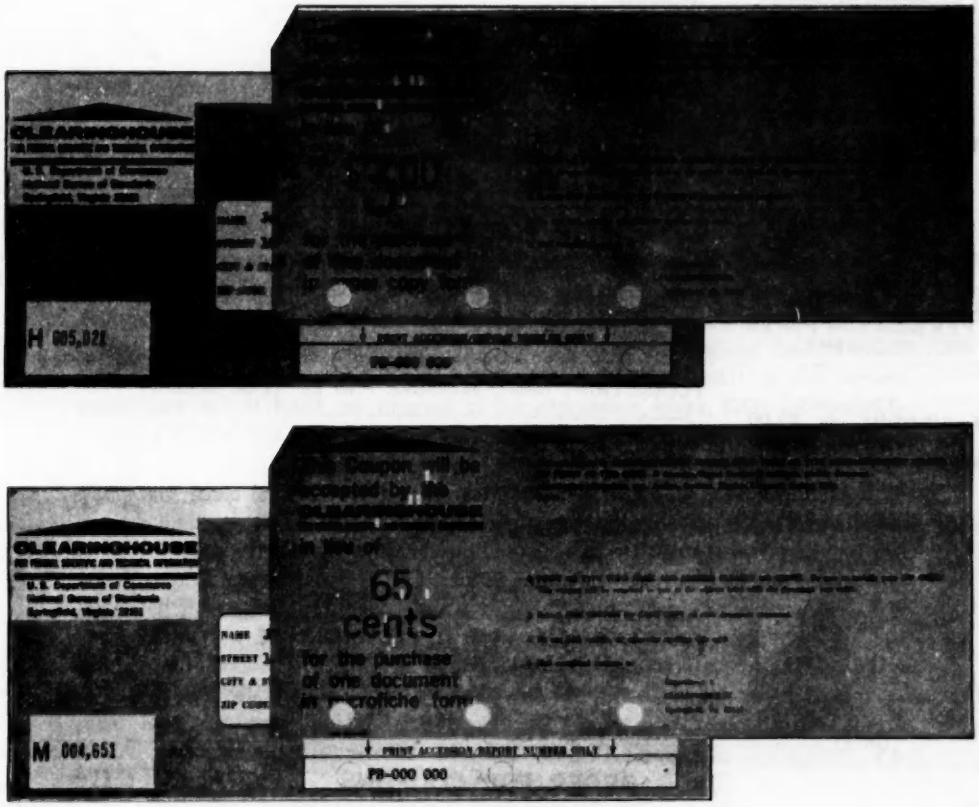

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FOREWORD

U. S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS is produced by computer from machineable records generated by four Federal agencies which announce R&D reports. Machineable records from the Atomic Energy Commission, the National Aeronautics and Space Administration, the Defense Documentation Center and the Clearinghouse for Federal Scientific and Technical Information are merged to produce USGRDR. All of the reports announced in USGRDR are indexed in the companion index, GOVERNMENT-WIDE INDEX TO FEDERAL RESEARCH & DEVELOPMENT REPORTS.

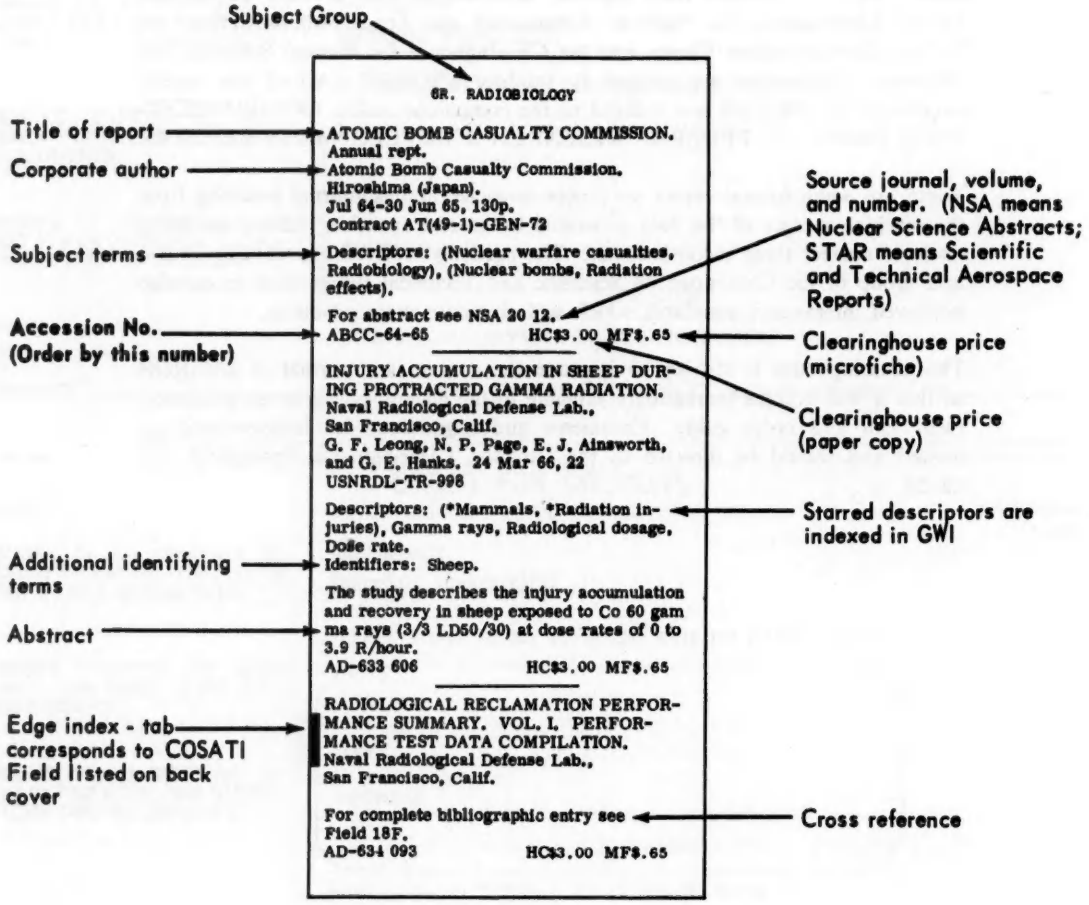
There are some format errors and inconsistencies in this journal resulting from the machine merger of the data generated by several agencies. Efforts are being made to correct these inconsistencies. The agencies involved are working with a task group of the Committee on Scientific and Technical Information to develop improved interagency standards which will eliminate these problems.

The Clearinghouse is striving to improve the content and format of USGRDR so that it will become increasingly valuable to the general public as an announcement tool and order guide. Comments and suggestions for improvement are invited and should be directed to the Director, Clearinghouse, Springfield, Va. 22151.

USGRDR FORMAT

Reports are announced under 22 subject categories called FIELDS. Each FIELD is divided into subcategories called GROUPS. Documents are listed alphanumerically by accession number within the GROUP. This classification system was adopted by the Committee on Scientific and Technical Information (COSATI). The *COSATI Subject Category List* (AD 612 200) is available from the Clearinghouse at $3.00.

SAMPLE JOURNAL ENTRIES


Subject Group
6R. RADIOBIOLOGY
Title of report
ATOMIC BOMB CASUALTY COMMISSION. Annual rept.
Corporate author
Atomic Bomb Casualty Commission. Hiroshima (Japan).
Jul 64-30 Jun 65, 130p.
Contract AT(49-1)-GEN-72
Subject terms
Descriptors: (Nuclear warfare casualties, Radiobiology), (Nuclear bombs, Radiation effects).
Source journal, volume, and number. (NSA means Nuclear Science Abstracts; STAR means Scientific and Technical Aerospace Reports)
For abstract see NSA 20 12.
Accession No. (Order by this number)
ABCC-64-65 HC$3.00 MF$.65
Clearinghouse price (microfiche)
Clearinghouse price (paper copy)
INJURY ACCUMULATION IN SHEEP DURING PROTRACTED GAMMA RADIATION.
Naval Radiological Defense Lab., San Francisco, Calif.
G. F. Leong, N. P. Page, E. J. Ainsworth, and G. E. Hanks. 24 Mar 66, 22
USNRDL-TR-998
Descriptors: (*Mammals, *Radiation injuries), Gamma rays, Radiological dosage, Dose rate.
Starred descriptors are indexed in GWI
Additional identifying terms
Identifiers: Sheep.
Abstract
The study describes the injury accumulation and recovery in sheep exposed to Co 60 gamma rays (3/3 LD50/30) at dose rates of 0 to 3.9 R/hour.
AD-633 606 HC$3.00 MF$.65
Edge index - tab corresponds to COSATI Field listed on back cover
RADIOLOGICAL RECLAMATION PERFORMANCE SUMMARY. VOL. I. PERFORMANCE TEST DATA COMPILATION.
Naval Radiological Defense Lab., San Francisco, Calif.
For complete bibliographic entry see Field 18F.
Cross reference
AD-634 093 HC$3.00 MF$.65

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SUBJECT CATEGORY HEADINGS

Use Edge Index on back cover to locate COSATI Field in journal

COSATI FIELD

01 AERONAUTICS

Includes aerodynamics; aeronautics; aircraft; aircraft flight control and instrumentation; and air facilities.

02 AGRICULTURE

Includes agricultural chemistry; agricultural economics; agricultural engineering; agronomy and horticulture; animal husbandry; and forestry.

03 ASTRONOMY AND ASTROPHYSICS

Includes astronomy; astrophysics; and celestial mechanics.

04 ATMOSPHERIC SCIENCES

Includes atmospheric physics and meteorology.

05 BEHAVIORAL AND SOCIAL SCIENCES

Includes administration and management; documentation and information technology; economics; history, law and political science; human factors engineering; humanities; linguistics; man-machine relations; personnel selection, training, and evaluation; psychology (individual and group behavior); and sociology.

06 BIOLOGICAL AND MEDICAL SCIENCES

Includes biochemistry; bioengineering; biology; bionics; clinical medicine; environmental biology; escape, rescue, and survival; food; hygiene and sanitation; industrial (occupational) medicine; life support; medical and hospital equipment and supplies; microbiology; personnel selection and maintenance (medical); pharmacology; physiology; protective equipment; radiobiology; stress physiology; toxicology; and weapon effects.

07 CHEMISTRY

Includes chemical engineering; inorganic chemistry; organic chemistry; physical chemistry; and radio and radiation chemistry.

08 EARTH SCIENCES AND OCEANOGRAPHY

Includes biological oceanography; cartography; dynamic oceanography; geochemistry; geodesy; geography; geology and mineralogy; hydrology and limnology; mining engineering; physical oceanography; seismology; snow, ice, and permafrost; soil mechanics; and terrestrial magnetism.

09 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes components; computers; electronic and electrical engineering; information theory; subsystems; and telemetry.

10 ENERGY CONVERSION (Non-Propulsive)

Includes conversion techniques; power sources; and energy storage.

COSATI FIELD

11 MATERIALS

Includes adhesives and seals; ceramics, refractories, and glasses; coatings, colorants, and finishes; composite materials; fibers and textiles; metallurgy and metallography; miscellaneous materials; oils, lubricants, and hydraulic fluids; plastics; rubbers; solvents, cleaners, and abrasives; and wood and paper products.

12 MATHEMATICAL SCIENCES

Includes mathematics and statistics and operations research.

13 MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

Includes air conditioning, heating, lighting, and ventilating; civil engineering; construction equipment, materials, and supplies; containers and packaging; couplings, fittings, fasteners, and joints; ground transportation equipment; hydraulic and pneumatic equipment; industrial processes; machinery and tools; marine engineering; pumps, filters, pipes, tubing, fittings, and valves; safety engineering; and structural engineering.

14 METHODS AND EQUIPMENT

Includes cost effectiveness; laboratories, test facilities, and test equipment; recording devices; reliability; and reprography.

15 MILITARY SCIENCES

Includes antisubmarine warfare; chemical, biological, and radiological warfare; defense; intelligence; logistics; nuclear warfare; and operations, strategy, and tactics.

16 MISSILE TECHNOLOGY

Includes missile launching and ground support; missile trajectories; missile warheads and fuzes; and missiles.

17 NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES

Includes acoustic detection; communications; direction finding; electromagnetic and acoustic countermeasures; infrared and ultraviolet detection; magnetic detection; navigation and guidance; optical detection; radar detection; and seismic detection.

18 NUCLEAR SCIENCE AND TECHNOLOGY

Includes fusion devices (thermonuclear); isotopes; nuclear explosions; nuclear instrumentation; nuclear powerplants; radiation shielding and protection; radioactive wastes and fission products; radioactivity; reactor engineering and operation; reactor materials; reactor physics; reactors (power); reactors (non-power); and SNAP technology.

19 ORDNANCE

Includes ammunition, explosives; bombs; combat vehicles; explosions, ballistics, and armor; fire control and bombing systems; guns; rockets; and underwater ordnance.

20 PHYSICS

Includes acoustics; crystallography; electricity and magnetism; fluid mechanics; masers and lasers; optics; particle accelerators; particle physics; plasma physics; quantum theory; solid-mechanics; solid-state physics; thermodynamics and wave propagation.

21 PROPULSION AND FUELS

Includes air-breathing engines; combustion and ignition; electric propulsion; fuels; jet and gas turbine engines; nuclear propulsion; reciprocating engines; rocket motors and engines; and rocket propellants.

22 SPACE TECHNOLOGY

Includes astronautics; spacecraft; spacecraft trajectories and reentry; and spacecraft launch vehicles and ground support.

RESEARCH highlights

Reports of current high industrial interest

Highlighted documents, unless otherwise designated, are sold at the new unit price of $3.00 each, 65 cents microfiche.

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Space Technology

ON APRIL 20, 1967, SURVEYOR III spacecraft successfully soft-landed on the surface of the Moon in a small depression in the southeast portion of Oceanus Procellarum, about 230 miles south of the crater Copernicus. From April 20 to May 3, 1967, the spacecraft took 6315 pictures of the lunar surface, the planet Venus, and Earth during and after an eclipse. In addition to the photographic apparatus, Surveyor III was equipped with a surface sampler. The surface sampler made 8 bearing tests and 14 impact tests on the lunar surface, and it dug 4 trenches and picked up 3 objects. One of these objects, a small rock, was gripped in the surface-sampler scoop, which exerted a pressure of at least 10^7 dynes/cm^3 (10^2 psi) on the rock without apparently crushing or breaking it. The spacecraft also recorded data on the albedo content and electrical and thermal properties of the lunar surface in its immediate vicinity.

The Preliminary Report of the Surveyor III mission is now available from the Clearinghouse. The report contains descriptions of the spacecraft itself, the launch, and the touchdown on the Moon, and presents results of the tests performed. ORDER. . . . . N67-32582 -- SURVEYOR III, A PRELIMINARY REPORT. . . . . NASA, Washington, D. C., June 67, 165p.

Biological and Medical Sciences

IN THE DEVELOPMENT OF ARTIFICIAL HEART-ASSIST DEVICES, THE NEED HAS ARISEN FOR MATERIALS THAT ARE COMPATIBLE WITH BLOOD IN ALL RESPECTS, including coagulation, interactions with formed elements, and damage to blood proteins. Implicit in the development of such materials is the necessity of obtaining basic information about the interactions occurring at the blood/foreign-surface interface. In order to help provide knowledge in this area, the National Institutes of Health have contracted Battelle Memorial Institute to conduct research aimed at developing these blood-compatible materials. The third summary report published by Battelle is now available; the report describes the optimization of heparinization techniques for a few selected polymer systems and basic studies on the blood/foreign-surface interface. The report also contains experimental results, and radioisotope and in vivo studies. The Appendix contains discussions of the synthetic techniques employed, the radioisotope methodology, protein-adsorption studies, and the apparatus used by the tracerlab for excited-gas reactions. ORDER. . . . . PB-175 668 -- DEVELOPMENT OF BLOOD-COMPATIBLE POLYMERIC MATERIALS. . . . . R. D. Falb et al., Battelle Memorial Inst., Columbus, Ohio, Mar. 67, 66p.

Control Systems and Instrumentation

AN ALL DIELECTRIC INFRARED BEAMSPLITTER has been successfully designed and fabricated by the Perkin-Elmer Corporation as a result of work sponsored by the National Aeronautics and Space Administration. The beamsplitter consists of a multilayer system of thin films deposited on a potassium bromide substrate and operates in the 5- to 30-micron region of the spectrum. Because it was designed specifically for use in an interferometer spectrometer to be carried in a NIMBUS B satellite, the beamsplitter had to possess mechanical properties adequate to survive a spacecraft launch and to maintain its optical characteristics during an extended mission in a spacecraft environment.

A recently published report describes the design and fabrication of the beamsplitter and suggests the development of an unsupported (substrateless) beamsplitter as a promising extension of the work to yield a great increase in system performance. Such a system could operate up to at least 50 microns and eliminate the need for path-length compensating elements, with a resultant decrease in system weight. ORDER. . . . . N67-18157 -- DEVELOPMENT OF AN ALL DIELECTRIC INFRARED BEAMSPLITTER OPERATING IN THE 5 TO 30 MICRON REGION. . . . . P. L. Heinrich et al., Perkin-Elmer Corp., Norwalk, Conn., for NASA, Feb. 67, 116p.

Food Processing

AN INVESTIGATION TO DETERMINE THE COMMERCIAL FEASIBILITY OF REMOVING RADIONUCLIDES (I-131 and Sr-90) FROM FRESH MILK has been completed by the Producers Creamery Company of Springfield, Missouri. The laboratory investigations were conducted on bench-scale equipment designed to simulate the proposed modification of the Lebanon, Missouri Sr-90 Removal Plant. This modification involved the integration of a Dowex 2X8 anion-exchange resin column between the existing raw-milk pre-heater and citric-acid injection system. An initial run employing approximately 35,000 pounds of Grade A Whole Milk and three full-scale runs each employing 100,000 pounds of Grade A Whole Milk were conducted. Results of physical and chemical tests indicated that physical and compositional changes in the milk paralleled those resulting from the removal of Sr-90 alone. Radiological assays indicated that more than 99 percent I-131 removal was realized for in vitro labeled milk. Average removal efficiencies for Sr-85 and Sr-90 were 94.6 and 90.0 percent, respectively. The manufacturing cost of I-131 and Sr-90 removal were found to be 6.3 cents per quart as compared to 2.3 cents per quart for Sr-90 removal alone. ORDER. . . . . PB-175 709 -- REMOVING RADIONUCLIDES FROM FRESH MILK. . . . . Producers Creamery Co., Springfield, Mo., for U. S. Dept. of Health, Education, and Welfare, June 66 (recently recd), 208p.

Information Technology

A MAJOR INVESTIGATION TO DETERMINE HOW SCIENTISTS AND ENGINEERS ACQUIRE INFORMATION has recently been completed by the Douglas Missile and Space Systems Division of Douglas Aircraft. The investigation characterizes the scientific- and technical-information needs of 1,500 scientists and engineers from 73 companies, 8 research institutes,

and 2 universities; and the flow of scientific and technical information (flow process) inherent in satisfying these needs. Interviewers asked 63 questions in the following four subject areas: (1) the user of scientific and technical information, (2) the user's most recent scientific or technical task, (3) the user's general utilization of the information system, and (4) the user's search and acquisition process for information used in task performance. The report contains a summary of the goals for the flow process, a future analysis of the flow process, a characterization of the flow process, and an analysis of the flow-process data. ORDER. . . . . AD-657 558 -- FLOW OF SCIENTIFIC AND TECHNICAL INFORMATION: THE RESULTS OF A RECENT MAJOR INVESTIGATION. . . . . A. F. Goodman, Douglas Aircraft, Huntington Beach, Calif., Sept. 67, 60p.

Mathematics

THE GERTRUDE BLANCH ANNIVERSARY VOLUME, published in February, 1967, on the occasion of her retirement is now available from the Clearinghouse. The volume contains a dedication by Gaetano Fichera, and 18 papers in the field of mathematics by the following contributors: John V. Armitage, Mark C. Breiter, Donald S. Clemm, Henry E. Fettis, Gaetano Fichera, Karl G. Guderley, H. Leon Harter, Charles L. Keller, Paruchuri R. Krishnaiah, Yudell L. Luke, Mary D. Lum, Robert E. Lynch, Knox Millsaps, Bertram Mond, Ida Rhodes, Paul R. Rider, Max G. Scherberg, Oved Shisha, Norman L. Soong, Henry C. Thacher, Jr., Emma M. Valentine, and Peter Wynn. ORDER. . . . . AD-657 323 -- BLANCH ANNIVERSARY VOLUME. . . . . Bertram Mond (Ed.), Aerospace Research Labs., U. S. Air Force, Wright-Patterson AFB, Ohio, Feb. 67, 375p.

Metals, Nonferrous and Alloys

THE UPSURGE IN INTEREST IN SINGLE CRYSTALS OF THE ALKALI METALS during the past few years is the consequence of the relative simplicity of the electronic configuration of these metals. This simplicity permits a more complete interpretation of accoustical attenuation data, neutron diffraction patterns, and the basic physical properties of the body-centered cubic metals in general.

The Virginia Institute for Scientific Research has recently completed studies on the crystal growth of the alkali metals, the rare earths, and cobalt, and published their findings in a three-part report. Part I is a description of the methods for handling and growing oriented single crystals of lithium, sodium, potassium, and rubidium. Reagents are recommended

for use in acid string cutting, and methods and etchants are described for optical orientation of single crystals. Part II contains a description of the growth of single crystals of cobalt with minimum macroscopic defects by the Czochralski technique. Part III describes attemtps to grow single crystals of cobalt by a hydrothermal technique and discusses the various problems encountered in this method. ORDER. . . . . AD-657 053 -- CRYSTAL GROWTH STUDIES OF THE ALKALI METALS, THE RARE EARTHS, AND COBALT. . . . . Virginia Inst. for Scientific Research, Richmond, for the Air Force, Aug. 67, 103p.

Metalworking and Metal Forming

THE INTERFACE FRICTION BETWEEN A PLASTICALLY DEFORMING METAL AND THE WORK TOOLS during any metalworking process can have a great effect on tool wear, working forces, and the surface quality of the product. A recently published report by the IIT Research Institute describes the relation between interface friction and surface damage, and the way in which they are affected by temperature, atmosphere, and pressure, for various aerospace alloys versus conventional and coated die combinations. Evaluation was made by means of two simulating tests: a twist-compression technique and ring-upsetting experiments. Hot rolling tests were performed in order to correlate the results with conventional metalworking practice.

7075 Al, Ti-6Al-4V, 4140 steel, TZM, and Hastelloy X were used as workpiece materials. These materials were deformed with tools made of H12, 4140, WC, Al_2O_3-coated H12, boronized 4140, chromized 4140, and titanium carbide-coated 4140. Significant variations in friction due to die-surface composition were observed. The most desirable anvil material from both frictional and mechanical aspects was found to be the boronized 4140. ORDER. . . . . AD-657 617 -- INVESTIGATION OF INTERFACE FRICTION BETWEEN TOOL AND WORKPIECE MATERIALS UNDER CONDITIONS OF PLASTIC DEFORMATION. . . . . J. A. Newnham and J. A. Schey, IIT Research Inst., Chicago, Ill., for the Navy, Aug 67, 92p.

Transportation (Land, Sea, Air, Space)

ANTICIPATED PUBLIC REACTION TO THE SONIC BOOM is one of the major questions in the development of the supersonic transport (SST). In order to provide this information, a series of experiments were conducted at Edwards Air Force Base with the following objectives: (1) to measure the

judgements of the relative acceptability of sonic booms and noise of different intensities from various types of aircraft; (2) to determine the response of typical house structures to sonic booms having different signature characteristics; (3) to obtain detailed measures of sonic boom signatures in time and space as functions of the type of aircraft and mode of operation, and the atmosphere and ground through which the wave was propagated; and (4) to observe the response of animals to the sonic booms. A recently published report contains detailed descriptions of the experiments, procedures, and experimental results obtained to data. ORDER. . . . . AD-655 310 -- SONIC BOOM EXPERIMENTS AT EDWARDS AIR FORCE BASE, INTERIM REPORT. . . . . Stanford Research Inst., Menlo Park, Calif., for the National Sonic Boom Evaluation Office, July 67, 488p.

RESEARCH & DEVELOPMENT REPORTS

1. AERONAUTICS

1A. Aerodynamics

A FINITE-DIFFERENCE METHOD SOLUTION OF NON-SIMILAR, EQUILIBRIUM AND NON-EQUILIBRIUM AIR, BOUNDARY LAYER EQUATIONS WITH LAMINAR AND TURBULENT VISCOSITY MODELS. PART I. ANALYSIS.
Final technical rept.,
General Applied Science Labs., Inc., Westbury, N. Y.
H. E. Gould, and L. S. Galowin. 2 Feb 65, 25p
GASL-TR-501-Pt-1
Contract SD-149, ARPA Order-396

Descriptors: (*Boundary layer, *Reentry vehicles), Dissociation, Gas ionization, Air, Chemical reactions, Partial differential equations, Axially symmetric flow, Two-dimensional flow, Numerical analysis, Programming (Computers), Laminar boundary layer, Turbulent boundary layer, Viscosity, Diffusion, Thermodynamics, Nonequilibrium flow, Shock waves, Flow fields, Transport properties, Hypersonic flow, Series, Atmosphere entry, Chemical equilibrium, Reaction kinetics.

An analysis is developed for the boundary layer flows, with dissociated and ionized air species in chemical equilibrium or with finite rate chemistry, about general body geometries at zero angle of attack. The partial differential equations for the boundary layer, about axisymmetric and two-dimensional bodies, are transformed to the Von Mise's stream function coordinate. The resulting equations are reduced to an algebraic system obtained by adopting an explicit finite-difference method of solution. These equations provide the basis for a computer program to obtain numerical solutions. Laminar and several turbulent viscosity models are included in the analysis. Turbulent diffusivity models based upon the law of the wall, law of the wake, a curve-fit to pipe flow eddy viscosity and laminar viscosity contributions are introduced. (Author)
AD-474 645 HC$3.00 MF$0.65

REPLY BY AUTHOR TO M. H. BERTRAM'S COMMENT,
Aerospace Research Labs Wright-Patterson AFB Ohio
Anthony W. Fiore. 10 Nov 66, 3p Rept no. ARL-67-0074
Availability: Published in Spacecraft and Rockets 1967.

Descriptors: (*Air, Viscosity), Kinetic theory, Linear systems, Temperature.

In the original article on 'Viscosity of Air' (AD-638 833) the author inadvertently referred to the Bromley-Wilke results as 'data.' Bertram pointed out that the Bromley-Wilke results are obtained from kinetic theory considerations. In this reply, the author states that this point should be obvious to the reader of the original article since the reference used to obtain the Bromley-Wilke results was given in the article and does indeed show the results to come from the kinetic theory.
AD-656 152 Not available from CFSTI.

ON THE METHOD OF INTEGRAL RELATIONS.
Aerospace Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 20D.
AD-656 158 Not available from CFSTI.

RESTRICTED VARIATIONAL PRINCIPLE METHOD FOR THE FREE MOLECULAR MIXING OF PARALLEL STREAMS,
Aerospace Corp El Segundo Calif Labs Div
For primary bibliographic entry see Field 20D.
AD-656 337 HC$3.00 MF$0.65

A METHOD OF CALCULATING QUASI TWO-DIMENSIONAL FLOWS THROUGH CASCADES,
California Inst of Tech Pasadena Hydrodynamics Lab
For primary bibliographic entry see Field 20D.
AD-656 428 HC$3.00 MF$0.65

NUMERICAL SOLUTION OF THE TURBULENT-BOUNDARY-LAYER EQUATIONS,
Douglas Aircraft Co Inc Long Beach Calif Aircraft Div
For primary bibliographic entry see Field 20D.
AD-656 430 HC$3.00 MF$0.65

AIR LIQUEFACTION BOUNDARIES EXPERIMENTALLY DETERMINED FOR THE BALLISTIC RESEARCH LABORATORIES' SUPERSONIC AND HYPERSONIC WIND TUNNELS,
Ballistic Research Labs Aberdeen Proving Ground Md
For primary bibliographic entry see Field 20D.
AD-656 445 HC$3.00 MF$0.65

BURNETT EQUATIONS AND SHOCK STRUCTURE.
Polytechnic Inst of Brooklyn N Y Dept of Aerospace Engineering and Applied Mechanics
For primary bibliographic entry see Field 20D.
AD-656 575 HC$3.00 MF$0.65

MAYER'S THEORY OF CONDENSATION AND HOMOGENEOUS NUCLEATION,
Yale Univ New Haven Conn Dept of Engineering and Applied Science
For primary bibliographic entry see Field 20M.
AD-656 640 HC$3.00 MF$0.65

ROTATIONAL STAGNATION-POINT FLOW,
Cornell Univ Ithaca N Y
For primary bibliographic entry see Field 20D.
AD-656 664 Not available from CFSTI.

THE RESPONSE OF A CYLINDRICAL STRUCTURE TO A TURBULENT FLOW FIELD AT SUBCRITICAL REYNOLDS NUMBER,
Toronto Univ (Ontario) Inst for Aerospace Studies
For primary bibliographic entry see Field 20D.
AD-656 689 HC$3.00 MF$0.65

AN APPROXIMATE SOLUTION OF THE BOUNDARY LAYER EQUATIONS USING THE METHOD OF PARAMETRIC DIFFERENTIATION,
Massachusetts Inst of Tech Cambridge Fluid Dynamics Research Lab
For primary bibliographic entry see Field 20D.
AD-656 693 HC$3.00 MF$0.65

MASSIVE BLOWING EXPERIMENTS,
Aerospace Corp El Segundo Calif Labs Div
For primary bibliographic entry see Field 20D.
AD-656 705 HC$3.00 MF$0.65

CONDENSATION IN A RAPIDLY EXPANDING METAL VAPOR-INERT GAS MIXTURE,
Michigan Univ Ann Arbor Dept of Aerospace Engineering
For primary bibliographic entry see Field 20M.
AD-656 708 HC$3.00 MF$0.65

SHOCK WAVE TRANSMISSION THROUGH A LARGE RESTRICTION IN A CONSTANT AREA DUCT.
Ballistic Research Labs Aberdeen Proving Ground Md
For primary bibliographic entry see Field 20D.
AD-656 744 HC$3.00 MF$0.65

VISCOUS TRANSONIC SPIRAL AND RADIAL FLOW,
Michigan Univ Ann Arbor Gas Dynamics Labs
For primary bibliographic entry see Field 20D.
AD-656 749 HC$3.00 MF$0.65

A METHOD FOR PREDICTING THE AERODYNAMIC LOADS AND DYNAMIC RESPONSE OF THE ROTOR BLADES OF A TANDEM-ROTOR HELICOPTER.
Technical rept.,
Cornell Aeronautical Lab Inc Buffalo N Y
John C. Balcerak. Jun 67, 91p Rept no. CAL-BB-1960-S-1
USAAVLABS-TR-67-38
Contract DA-44-177-AMC-207 (T)

Descriptors: (*Rotor blades (Rotary wings), Aerodynamic loading), (*Aerodynamic loading, Mathematical prediction), Helicopter rotors, Wake, Flight, Aerodynamic characteristics, Lift.
Identifiers: H-47 aircraft.

The blades of each rotor are represented by segmented lifting lines located at the quarterchord positions of the blades and the vortex strength is assumed to be constant over each segment of the blade at each of an arbitrary number of azimuth positions. The wake is represented by a mesh of shed and trailing vortex filaments up to an arbitrary finite distance behind each blade, and beyond this point the wake is represented by a segmented, tip-trailing vortex or by segmented, tip- and root-trailing vortices. The aerodynamic loadings and the flapwise structural bending moments were computed for the CH 47A tandem-rotor helicopter for advance ratios of 0.08, 0.14 and 0.24. Comparisons of these results with measured results for individual test points are presented as radial distributions of the first three harmonic components and as time histories which include eleven harmonics. The measured data were generally presented in the form of typical results from a statistical sampling of measured data from similar test conditions. (Author)
AD-656 755 HC$3.00 MF$0.65

HIGH VELOCITY RADIATING FLOWS.
General Electric Co Philadelphia Pa Missile and Space Div
For primary bibliographic entry see Field 20M.
AD-656 766 HC$3.00 MF$0.65

NONEQUILIBRIUM RADIATION AND IONIZATION IN SHOCK WAVES,
Purdue Univ Lafayette Ind School of Aeronautics Astronautics and Engineering Sciences
For primary bibliographic entry see Field 20D.
AD-656 767 HC$3.00 MF$0.65

TRANSITION TO TURBULENCE FOR SUBMERGED INCOMPRESSIBLE AND FREE COMPRESSIBLE FLUID JETS.
Martin Co Orlando Fla
For primary bibliographic entry see Field 20D.
AD-656 780 HC$3.00 MF$0.65

THREE-COMPONENT MEASUREMENTS ON RECTANGULAR WINGS WITH CAVITATION FINAL REPORT.
Max-planck-institut Fur Stromungsforschung, Gottingen (West Germany).
H. Reichardt, and W. Sattler. Mar 67, 65p AD-652393
Contract N62558-3720

Descriptors: *Cavitation flow, *Rectangular wing, Angle, Aspect, Attack, Cavitation, Dimensional,

Drag, Flat, Flow, Gauge, Hydrofoil, Model, Motion, Pitch, Plate, Ratio, Rectangle, Strain, Three, Wing.

For abstract, see STAR 05 18.
N67-31504 HC$3.00 MF$0.65

SIDESLIP CHARACTERISTICS AT VARIOUS ANGLES OF ATTACK FOR SEVERAL HYPERSONIC MISSILE CONFIGURATIONS WITH CANARD CONTROLS AT A MACH NUMBER OF 2.01.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 16D.
For abstract, see STAR 05 18.
N67-31533 HC$3.00 MF$0.65

TABULATED DATA FROM A PRESSURE-DISTRIBUTION INVESTIGATION AT MACH NUMBER 2.01 OF THE WING OF A CANARD AIRPLANE MODEL.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va. C. Driver, and J. L. Jacocks. Dec 59, 201p NASA-TM-X-140

Descriptors: *Aircraft model, *Pressure distribution, *Table, *Trapezoidal wing, Aircraft, Angle of attack, Coefficient, Deflection, Distribution, Forebody, Geometry, Model, Position, Pressure, Supersonic, Tail, Test, Trapezoidal, Tunnel, Vertical, Wing.

For abstract, see STAR 05 18.
N67-31534 HC$3.00 MF$0.65

AN INVESTIGATION OF SUPERSONIC STORE INTERFERENCE IN THE VICINITY OF A 22 DEG SWEPT WING FUSELAGE CONFIGURATION AT MACH NUMBERS OF 1.61 AND 2.01.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va. D. J. Geier. 24 Feb 58, 106p NACA-RM-L57L18

Descriptors: *Aircraft configuration, *Swept wing, *Wind tunnel, *Wing-fuselage-store, Aircraft, Bomber, Configuration, Detachment, Drag, Force, Fuselage, Graph, Heavy, Interference, Lift, Moment, Pitch, Pressure, Store, Supersonic, Tunnel, Wind, Wing, Yaw.

For abstract, see STAR 05 18.
N67-31546 HC$3.00 MF$0.65

SINGLE STAGE EXPERIMENTAL EVALUATION OF VARIABLE GEOMETRY GUIDE VANES AND STATORS. PART II - ANNULAR CASCADE INVESTIGATIONS OF CANDIDATE VARIABLE GEOMETRY DESIGNS.
Pratt and Whitney Aircraft, West Palm Beach, Fla. Florida Research and Development Center. 14 Jul 67, 58p NASA-CR-54555, PWA-FR-2297 Contract NAS3-7604

Descriptors: *Guide vane, *Slot, *Stator, Aerodynamics, Cascade, Design, Flap, Geometry, Guide, Inlet, Simulation, Takeoff, Test, Tunnel, Vane, Variable, Wind.

For abstract, see STAR 05 18.
N67-31727 HC$3.00 MF$0.65

EXPERIMENTAL BEHAVIOR OF PENTABORANE-AIR COMBUSTION PRODUCTS DURING EXPANSION IN A CONVERGENT DIVERGENT NOZZLE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 21E.
For abstract, see STAR 05 18.
67-31730 HC$3.00 MF$0.65

EXPERIMENTAL INVESTIGATION OF BASE HEATING AND ROCKET HINGE MOMENTS FOR A SIMULATED MISSILE THROUGH A MACH NUMBER RANGE OF 0.8 TO 2.0.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 21H.
For abstract, see STAR 05 18.
N67-31731 HC$3.00 MF$0.65

INVESTIGATION OF THE AERODYNAMIC CHARACTERISTICS OF A SUPERSONIC HORIZONTAL- ATTITUDE VTOL AIRPLANE MODEL AT MACH NUMBERS OF 1.57, 2.14, 2.54, AND 2.87.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va. A. E. Franklin, and R. M. Lust. Oct 60, 155p NASA-TM-X-213

Descriptors: *Aircraft model, *Lateral stability, *Longitudinal stability, *Static aerodynamic characteristics, *Vtol aircraft, Aerodynamic, Aircraft, Attitude, Characteristics, Drag, Dynamic, Fin, Graph, Horizontal, Lateral, Longitudinal, Model, Pressure, Stability, Stagnation, Static, Supersonic, Tail, Tip, Tunnel, Vertical, Vtol, Wind, Wing.

For abstract, see STAR 05 18.
N67-31732 HC$3.00 MF$0.65

THE EFFECT OF TRAILING-EDGE CONTROL DEFLECTION ON THE LOADING OVER A 60 DEG DELTA-WING-BODY COMBINATION.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va. C. E. Mercer, and L. B. Salters, Jr.. Oct 59, 155p NASA-TM-X-122

Descriptors: *Aerodynamic load, *Body-wing combination, *Control surface, *Delta wing, *Trailing edge, *Transonic speed, Aerodynamic, Aileron, Body, Chord, Combination, Constant, Control, Deflection, Delta, Distribution, Edge, Flap, Load, Pressure, Speed, Surface, Tip, Trailing, Transonic, Tunnel, Wind, Wing.

For abstract, see STAR 05 18.
N67-31739 HC$3.00 MF$0.65

PRESSURE MEASUREMENTS ON A HYPERSONIC GLIDE CONFIGURATION HAVING 79.5 DEG SWEEPBACK AND 45 DEG DIHEDRAL AT A MACH NUMBER OF 4.95.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va. M. Cooper, and C. R. Gunn. Nov 59, 15p NASA-TM-X-223

Descriptors: *Dihedral effect, *Pressure distribution, *Sweepback angle, Angle, Angle of attack, Configuration, Dihedral, Distribution, Effect, Hypersonic, Mach number, Pressure, Reynolds number, Surface, Sweepback, Symmetry, Tangent, Wedge.

For abstract, see STAR 05 18.
N67-31814 HC$3.00 MF$0.65

REPORT OF THE SESSION OF THE WGLR SUBCOMMITTEE ON AERODYNAMICAL COMPUTER TECHNOLOGY.
Bericht Ueber Die Sitzung des Wglr-unteraus-Schusses Aerodynamische Messtechnik
Wissenschaftliche Gesellschaft Fur Luft- Und Raumfahrt, Cologne (West Germany).
May 66, 220p DLR-MITT-66-04
in German Conf. Held At Munich, 12 Mar. 1965

Descriptors: *Aerodynamics, *Analog-to-digital converter, *Automatic data processing system, *Computer method, *Conference, *Electronic equipment, *Flight test, *Quality control, Acquisition, Analog, Automatic, Bit, Channel, Computer, Control, Converter, Data, Digital, Electronic, Engine, Equipment, Evaluation, Flight, Flow, Frequency, Impulse, Magnetic, Measurement, Memory, Meter, Method, Multiplexer, Processing, Quality, Readout, Retrieval, System, Tape, Technology, Telemetry, Test.

For abstract, see STAR 05 18.
N67-31881 HC$3.00 MF$0.65

AERODYNAMIC CHARACTERISTICS OF A TAILLESS FIXED-WING SUPERSONIC TRANSPORT CONFIGURATION AT MACH NUMBER 2.20.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va. W. A. Corlett, and G. V. Frost. May 64, 45p NASA-TM-X-960

Descriptors: *Aerodynamic characteristics, *Fixed-wing aircraft, *Pressure tube, *Supersonic transport, *Tailless aircraft, Aerodynamic, Aircraft, Angle of attack, Characteristics, Configuration, Delta, Edge, Fixed, Lateral, Leading, Longitudinal, Model, Moment, Pitch, Planform, Pressure, Supersonic, Tailless, Transport, Trapezoidal, Tube, Tunnel, Wing.

For abstract, see STAR 05 18.
N67-31933 HC$3.00 MF$0.65

REPORT ON THE SESSION OF THE WGLR SUBCOMMITTEE ON FLIGHT CONTROL.
Bericht Ueber Die Sitzung des Wglr- Fachausschusses Flugfuehrung
Wissenschaftliche Gesellschaft Fur Luft- Und Raumfahrt, Cologne (West Germany).
Oct 66, 96p DLR-MITT-66-19
in German and English Conf. Held in Stuttgart, 14 Dec. 1965

Descriptors: *Automatic control, *Conference, *Stability augmentation, *Supersonic aircraft, *Sweptback wing, Acceleration, Aerodynamics, Aircraft, Augmentation, Automatic, Autopilot, Compensation, Configuration, Control, Electrohydraulic, Electronics, Flight, Force, Inertia, Lift, Pitch, Problem, Safety, Servomotor, Stability, Stick, Supersonic, Transport, Wind, Wing, Yaw.

For abstract, see STAR 05 18.
N67-31956 HC$3.00 MF$0.65

EFFECTS OF JET PLUMING ON THE STATIC STABILITY OF FIVE ROCKET MODELS AT MACH NUMBERS OF 4, 5 AND 6 AND STATIC PRESSURE RATIOS UP TO 26,000.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va. W. F. Hinson, and R. J. Mc Ghee. Aug 67, 69p NASA-TN-D-4064
Contract 124-07-03-05-23

Descriptors: *Jet plume, *Rocket exhaust, *Static stability, Angle of attack, Cone, Cylinder, Effect, Exhaust, Fin, Flare, Force, Jet, Mach number, Model, Moment, Normal, Pitch, Plume, Pressure, Ratio, Rocket, Shape, Stability, Static.

For abstract, see STAR 05 18.
N67-31989 HC$3.00 MF$0.65

LOW-SPEED CHARACTERISTICS OF A VARIABLE-SWEEP SUPERSONIC TRANSPORT MODEL WITH A BLENDED ENGINE FUSELAGE AND ENGINE-MOUNTED TAILS.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1C.
For abstract, see STAR 05 18.
N67-32140 HC$3.00 MF$0.65

MEASUREMENTS OF FLOW PROPERTIES IN THE VICINITY OF THREE WING-FUSELAGE COMBINATIONS AT MACH NUMBERS OF 1.61 AND 2.01.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
H. W. Carlson. Oct 59, 74p NASA-TM-X-64

Descriptors: *Body-wing combination, *Delta wing, *Supersonic flow, *Swept wing, *Trapezoidal wing, *Wind tunnel, Angle of attack, Body, Coefficient, Combination, Delta, Flow, Pressure, Property, Reynolds number, Supersonic, Sweep, Trapezoidal, Tunnel, Wind, Wing.

For abstract, see STAR 05 18.
N67-32309 HC$3.00 MF$0.65

FULL-SCALE WIND-TUNNEL INVESTIGATION OF A VTOL AIRCRAFT WITH A JET-EJECTOR SYSTEM FOR LIFT AUGMENTATION.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
For primary bibliographic entry see Field 1C.
For abstract, see STAR 05 18.
N67-32321 HC$3.00 MF$0.65

WIND-TUNNEL INVESTIGATION AT MACH NUMBERS FROM 1.60 TO 2.86 OF THE STATIC AERODYNAMIC CHARACTERISTICS OF A SUPERSONIC TRANSPORT CONFIGURATION WITH VARIABLE-SWEEP WINGS EMPLOYING A DOUBLE INBOARD PIVOT.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1C.
For abstract, see STAR 05 18.
N67-32553 HC$3.00 MF$0.65

1B. Aeronautics

RADIOISOTOPE TAXI GUIDANCE SYSTEM PHASE I. FEASIBILITY STUDY.
Parametrics Inc Waltham Mass
For primary bibliographic entry see Field 17G.
AD-655 922 HC$3.00 MF$0.65

A STATISTICAL MODEL OF THE TEMPERATURE FIELD AT SUPERSONIC AIRCRAFT ALTITUDES.
Air Force Cambridge Research Labs L G Hanscom Field Mass
For primary bibliographic entry see Field 4B.
AD-656 309 HC$3.00 MF$0.65

STATISTICAL PRESENTATION OF NAVAL AIRCRAFT COUNTING ACCELEROMETER DATA FROM 1 JAN 1962 TO 1 OCT 1966,
Naval Air Engineering Center Philadelphia Pa Aeronautical Structures Lab
William K. Ragan, Jr. 22 Jun 67, 463p Rept no. NAEC-ASL-1108

Descriptors: (*Naval aircraft, *Loading (Mechanics)), Flight, Accelerometers, Maneuverability, Statistical data, Transducers, Tables.

A summary of normal (vertical) acceleration data recorded by counting accelerometer groups at four preset levels is presented for 46 models of naval aircraft. The frequency of exceeding these load-factor levels is tabulated by model and by individual aircraft. (Author)
AD-656 589 HC$3.00 MF$0.65

CRASH SURVIVAL DESIGN GUIDE,
Aviation Safety Engineering and Research Phoenix Ariz
For primary bibliographic entry see Field 13L.
AD-656 621 HC$3.00 MF$0.65

FLIGHT INVESTIGATION OF LONGITUDINAL SHORT PERIOD FREQUENCY REQUIREMENTS AND PIO TENDENCIES.
Cornell Aeronautical Lab Inc Buffalo N Y
For primary bibliographic entry see Field 1C.
AD-656 784 HC$3.00 MF$0.65

THEORETICAL DYNAMIC ANALYSIS OF THE LANDING LOADS ON A VEHICLE WITH A TRICYCLE LANDING GEAR.
National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
For primary bibliographic entry see Field 1C.
For abstract, see STAR 05 18.
N67-32394 HC$3.00 MF$0.65

STUDY ON THE FEASIBILITY OF V/STOL CONCEPTS FOR SHORT HAUL TRANSPORT AIRCRAFT.
Lockheed-california Co., Burbank.
Mar 67, 76p NASA-CR-73111, LR-20573
Contract NAS2-3035
Addendum Rept.

Descriptors: *Noise tolerance, *Tilting rotor, *Transport aircraft, *V/stol, Aircraft, Engine, Exhaust, Fan, Flap, Jet, Lift, Noise, Optimization, Propeller, Rotation, Rotor, Sensitivity, Standardization, Stop, Tilting, Tolerance, Transport, Turboshaft, Vortex, Weight, Wing.

For abstract, see STAR 05 18.
N67-32478 HC$3.00 MF$0.65

AIRCRAFT DESIGN-INDUCED PILOT ERROR.
Civil Aeronautics Board, Washington, D. C. Bureau of Safety.
Jul 67, 219p
Prepared in cooperation with National Transportation Safety Board. Dept. of Transportation.

Descriptors: (*Aviation accidents, *Human engineering), (*Pilots, Errors), (*Aircraft, Design), Airplanes, Aviation safety, Statistical analysis, Flight, Instruction manuals, Aircraft landings, Take-off.

The report presents an analysis of design-induced pilot error in general aviation accidents. It is based on a study fleet consisting of 35 makes and models of airplanes. The basis for selection of the study fleet, the make and models involved, and the accident types analyzed are presented. The term 'Design-Induced Error' was considered as including all factors that may have influenced the action or non-action of the pilot, and thus were related to the accident. Under this interpretation, factors that interfered with action which might have prevented the accident, and lack of data in flight manuals or published data requiring an unusual level of pilot competence are included among the factors inducing error. Airplane makes and models were grouped by type of utilization to provide a common exposure index, and by design parameters related to specific accident types. Frequency distributions of each accident type were prepared based on flight hours, total number of accidents, and number of active aircraft. (Author)
PB-175 629 HC$3.00 MF$0.65

1C. Aircraft

CRASH LOADS ENVIRONMENT STUDY.
Technical rept.,
Mechanics Research Inc El Segundo Calif
Donald P. Fitzgibbon, and Reuben P. Vollmer.
Feb 67, 184p
FAA-DS-67-2
Contract FA-66-WA-1511

Descriptors: (*Impact tests, *Commercial planes), Acceleration, Pitch (Motion), Instrumentation, Velocity, Shock (Mechanics), Tables, Measurement, Environmental tests, Transducers, Aviation accidents, Response, Damage, Fuselages, Wings, Structural properties, Load distribution.

The report provides a study of the survivable crash environment for commercial type aircraft. The study includes an analysis of the results of previous crash tests on both full-scale aircraft and aircraft components, as well as the data from actual commercial aircraft crashes during the period of 1955 through 1965. The data from the previous full-scale tests have been analyzed in a unique manner. The severity of each crash test has been determined by relating the characteristics of the measured acceleration time histories to the characteristics of human tolerance to acceleration. Shock spectra were obtained for all the pertinent acceleration time histories from crash tests and the methods determining equivalent pulses are presented. The application of this method to the specification of component test environment is discussed. The data from actual commercial crashes is presented and analyzed. It was found that the most common survivable accident can be described as occurring during the landing phase of the flight, with null pitch, roll and yaw angles, with an angle of impact of less than five degrees and with an impact velocity of 166 feet per second. The most common obstacle encountered during the crash was trees. The requirements for future crash tests on both full-scale aircraft and components are presented. These requirements are based on the results of the study. The crash parameters are selected for a modern jet aircraft to produce a marginally survivable accident. The instrumentation requirements are discussed and a data acquisition system is recommended. (Author)
AD-655 920 HC$3.00 MF$0.65

SOME EFFECTS OF AIRCRAFT GEOMETRY ON THE INCREMENTAL DRAG CHARACTERISTICS OF MARK 82 BOMBS,
David Taylor Model Basin Washington D C Aerodynamics Lab
For primary bibliographic entry see Field 19B.
AD-656 059 HC$3.00 MF$0.65

HIGH-TEMPERATURE AIRCRAFT WIRES,
General Electric Co Bridgeport Conn
For primary bibliographic entry see Field 9A.
AD-656 403 HC$3.00 MF$0.65

RESULTS OF MAIN ROTOR RADAR BLADE FLIGHT TESTS, MODEL UH-1B, S/N AF622023,
Bell Helicopter Co Fort Worth Tex
J. A. Mangum. 17 Nov 65, 183p
JANAIR-204-100-113

Descriptors: (*Aircraft antennas, Radar antennas), (*Helicopter rotors, Radar antennas), (*Rotor blades (Rotary wings), *Radar antennas), Design, Feasibility studies, Flight testing, Leading edge, Antenna radiation patterns, Statistical data.
Identifiers: H-1 aircraft.

Main rotor blades configured with leading edge radar antennas were installed on a Model UH-1B Helicopter, S/N AF 62-2023, Bell No. 543, for both ground and flight tests. Load level tests and basic electromagnetic radiation pattern tests were successfully completed. Load level tests confirmed previous measurements. All measured loads and vibrations were identical to production 204 blades. Flight characteristics are identical to a production UH-1B Helicopter. Radiation pattern tests were very successful and proved that the use of rotor blade antennas as a radar transmitting device is feasible. Based on preliminary analysis of flight test data, it is concluded that use of the main rotor blades for radar transmissions is practical. (Author)
AD-656 438 HC$3.00 MF$0.65

HELICOPTER ROTOR BLADE RADAR ANTENNA,
Bell Helicopter Co Fort Worth Tex
H. W. Upton, and D. W. Young. Jul 65, 37p
JANAIR-299-099-285
Contract Nonr-4148 (00)
Prepared in cooperation with Young (David W.) and Associates, Inc., Canoga Park, Calif. Presented to the Annual Radar Symposium of Michigan Univ., Ann Arbor, held at Fort Monmouth, N. J., 8-10 Jul 65.

Descriptors: (*Aircraft antennas, Radar antennas), (*Helicopter rotors, Radar antennas), (*Rotor blades (Rotary wings), *Radar antennas), Design, Military requirements, Pitch (Motion), Focusing, Slot antennas, Leading edge, Trailing edge, Weight, Antenna arrays.
Identifiers: H-1 aircraft.

The use of the helicopter main rotor blade as a scanning radar antenna can achieve significant reduction in weight, along with greatly improved performance, compared with conventional antennas. Material is cut from the existing blade to install the antenna so that no additional weight is added. The natural rotor motion scans the antenna so that the usual scanning motor and associated drive are completely eliminated. No radome is necessary; an important point because helicopters are now being designed with speeds of over 200 knots. The narrow beamwidth can make possible a radar with much greater resolution than any available for helicopter use today. (Author)
AD-656 439 HC$3.00 MF$0.65

VALUE ENGINEERING QUARTERLY REPORT FOR LIGHT OBSERVATION HELICOPTER AVIONICS PACKAGE.
Quarterly rept. no. 4, 22 Jan-21 Apr 67,
Sylvania Electronic Systems-Central Williamsville N Y
James B. Allis. Jul 67, 9p
ECOM-01943-4
Contract DA-28-043-AMC-01943 (E)
See also AD-819 086.

Descriptors: (*Value engineering, *Electronic equipment), Helicopters, Design, Management engineering, Tables, Reports.

The report is prepared in order to document the V. E. effort performed by Sylvania during the period 22 January 1967 through 21 April 1967. The report highlights accomplishments, future plans, problems experienced and anticipated, and plans for resolution of problems, if any. The report provides a means of measuring Sylvania's adherence to and compliance with the Sylvania Value Engineering Design Plans, as submitted to ECOM. (Author)
AD-656 477 HC$3.00 MF$0.65

BOUNDARY LAYER CONTROL SYSTEM INSTALLATION FOR THE YCV-2B AIRPLANE.
Final rept.,
Ryan Aeronautical Co San Diego Calif
C. A. Cordner. May 67, 203p Rept no. 65B017A
USAAVLABS-TR-66-33
Contract DA-44-177-AMC-35 (T)

Descriptors: (*Transport planes, *Boundary layer control systems), Feasibility studies, Take-off, Aircraft landings, Jet pumps, Performance (Engineering), Design.
Identifiers: CV-2 aircraft.

An investigation was made of the feasibility of installing a high lift boundary layer control (BLC) system in a YCV-2B airplane. Work was conducted to determine the feasibility and practicability of improvement of takeoff and landing performance of YCV-2B aircraft. Primary effort was directed to the development of a compressed air/gasoline fuel primary motor for driving the jet pump system. Secondary effort was directed to the design and evaluation of the system and to the performance characteristics. Also, smoke tunnel tests were conducted to determine qualitatively the effects of BLC on lift characteristics of the YCV-2B airfoils. Difficulty was experienced in the development of the primary motor owing to its inability to contain high temperatures. However, the experimental prototype model was satisfactory for obtaining limited jet pump data. The performance of the jet pump was not able to improve takeoff and landing characteristics of the aircraft. Design and technical analysis studies showed that the BLC system could not be installed and operated in the YCV-2B airplane with any reasonable expectancy of success. Included are equations, computer programs and methods for predicting design parameters, and performance characteristics of jet pumps and boundary layer controls systems. (Author)
AD-656 480 HC$3.00 MF$0.65

FREE OSCILLATIONS OF LINEAR SYSTEMS WITH VARIABLE PARAMETERS,
Foreign Technology Div Wright-Patterson AFB Ohio
F. A. Mikhailov. 2 May 67, 272p Rept no. FTD-MT-64-93
TT-67-62506
Svobodnye Kolebaniya Lineinykh Sistem s Peremennymi Parametrami, edited machine trans. of Aviatsionnyi Institut, Moscow. Trudy (USSR), v135 p1-272 1961.

Descriptors: (*Linear systems, *Oscillation), Stability, Variable-incidence wings, Differential equations, Asymptotic series, Control systems, Automatic, Time-interval counters, Trigonometry, Functions.

The book presents the principles of the theory of oscillations of linear systems with variable parameters, gives the results of investigations of the stability of oscillations, and examines the means for analyzing oscillations in a finite time interval. This book is intended for scientific workers and engineers who encounter, during their work, questions of the theory of oscillations and, in particular, for specialists in the calculation of the flight dynamics of flight vehicles and specialists in automatic control.
AD-656 559 HC$3.00 MF$0.65

TEST OF AVIATION ENGINES,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 21E.
AD-656 565 HC$3.00 MF$0.65

AERODYNAMICS OF POWER PLANT INSTALLATION, PART I.
Advisory Group for Aeronautical Research and Development Paris (France)
For primary bibliographic entry see Field 21E.
AD-656 569 HC$3.00 MF$0.65

AERODYNAMICS OF POWER PLANT INSTALLATION, PART II.
Advisory Group for Aeronautical Research and Development Paris (France)
For primary bibliographic entry see Field 21E.
AD-656 570 Not available from CFSTI.

CRASH SURVIVAL DESIGN GUIDE,
Aviation Safety Engineering and Research Phoenix Ariz
For primary bibliographic entry see Field 13L.
AD-656 621 HC$3.00 MF$0.65

PROCEEDINGS, FOURTH AFCRL SCIENTIFIC BALLOON SYMPOSIUM.
Special Repts. no. 57,
Air Force Cambridge Research Labs L G Hanscom Field Mass
James F. Dwyer. Jan 67, 294p Rept no. AFCRL-67-0075

Descriptors: (*Balloons, Symposia), (*Meteorological balloons, Symposia), Balloon equipment, Parachutes, Materials, Polyethylene plastics, Environmental tests, Instrumentation, Infrared optical systems, Meteorological instruments, Launching, Flight instruments, Atmosphere entry, Stratosphere, Humidity, Flight paths, Beacons, Tropopause.

The document is comprised of a series of papers presented at the Fourth AFCRL Scientific Balloon Symposium in September 1966. The range of subject matter was purposely selected to cover both the major branches of balloon technology and a limited number of topics having a common disciplinary background. It was intended to provide, thereby, the exchange of information on capabilities and requirements essential to the orderly advancement of this technology. (Author)
AD-656 692 HC$3.00 MF$0.65

ELECTROLUMINESCENCE: AN APPRAISAL FOR AVIONIC DISPLAY APPLICATIONS.
Litton Systems Inc Woodland Hills Calif Guidance Systems Lab
For primary bibliographic entry see Field 20F.
AD-656 733 Not available from CFSTI.

A METHOD FOR PREDICTING THE AERODYNAMIC LOADS AND DYNAMIC RESPONSE OF THE ROTOR BLADES OF A TANDEM-ROTOR HELICOPTER.
Cornell Aeronautical Lab Inc Buffalo N Y
For primary bibliographic entry see Field 1A.
AD-656 755 HC$3.00 MF$0.65

FLIGHT INVESTIGATION OF LONGITUDINAL SHORT PERIOD FREQUENCY REQUIREMENTS AND PIO TENDENCIES.
Final rept.,
Cornell Aeronautical Lab Inc Buffalo N Y
Dante A. DiFranco. Jun 67, 154p Rept no. CAL-TC-2083-F-1
AFFDL-TR-66-163
Contract AF 33 (615)-2536

Descriptors: (*Jet training planes, Stability), Handling, Flight testing, Simulation, Pilots, Maneuverability, Performance (Engineering), Oscillation, Frequency.
Identifiers: T-33 aircraft.

The results of a flight test program to investigate longitudinal short period frequency requirements and PIO (pilot-induced oscillation) tendencies are presented and discussed. Short period frequency requirements were investigated with a damping ratio of approximately 0.7 at three fixed values. PIO tendencies were investigated with various values. The feel system dynamic characteristics were held essentially constant throughout the program. A variable stability T-33 airplane was used as an in-flight simulator. Each configuration was evaluated as a fighter in 'up and away' flight. The evaluation pilots commented on each configuration and rated each numerically. An analysis of pilot ratings and pilot comments was made, and these in turn were related to various handling qualities parameters. In the analysis and interpretation of the handling qualities results, feel system dynamics and pilot-selected stick force gradients were also important considerations. (Author)
AD-656 784 HC$3.00 MF$0.65

PROCEEDINGS OF NASA CONFERENCE ON SUPERSONIC-TRANSPORT FEASIBILITY STUDIES AND SUPPORTING RESEARCH.

National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

Dec 63, 543p NASA-TM-X-905
Conf. Held At Nasa. Langley Research Center, 17-19 Sep. 1963

Descriptors: *Aircraft configuration, *Conference, *Handling quality, *Propulsion system, *Structural material, *Supersonic transport, Aerodynamic, Aircraft, Airworthiness, Boom, Characteristics, Configuration, Design, Handling, Material, Propulsion, Quality, Requirement, Scat, Sonic, Sonic boom, Structural, Supersonic, System, Transport.

For abstract, see STAR 05 18.
N67-31606 HC$3.00 MF$0.65

SPANWISE LOADINGS AND AERODYNAMIC CHARACTERISTICS FOR A SERIES OF TRAILING- EDGE CONTROLS ON A 40 DEG SWEPTBACK WING AT MACH NUMBERS OF 1.61 AND 2.01.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
K. R. Czarnecki, and E. J. Landrum. Nov 62, 70p NASA-TM-X-752

Descriptors: *Aerodynamic characteristics, *Span loading, *Sweptback wing, *Trailing edge, *Wing tip control, Aerodynamic, Angle, Attack, Bending, Coefficient, Control, Deflection, Edge, Force, Integration, Loading, Moment, Pressure, Reynolds number, Span, Supersonic, Tip, Trailing, Tunnel, Wind, Wing.

For abstract, see STAR 05 18.
N67-32002 HC$3.00 MF$0.65

LOW-SPEED CHARACTERISTICS OF A VARIABLE-SWEEP SUPERSONIC TRANSPORT MODEL WITH A BLENDED ENGINE FUSELAGE AND ENGINE-MOUNTED TAILS.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
V. E. Lockwood, and W. E. Thompson. Nov 64, 81p NASA-TM-X-1038

Descriptors: *Flight characteristics, *Supersonic transport, Blend, Characteristics, Control, Engine, Flight, Fuselage, Lateral, Longitudinal, Low speed, Mount, Pitch, Stability, Supersonic, Supersonic commercial air transport (scat), Sweep, Transport, Variable.

For abstract, see STAR 05 18.
N67-32140 HC$3.00 MF$0.65

LARGE-SCALE LOW-SPEED WIND-TUNNEL TESTS OF A DELTA WINGED SUPERSONIC TRANSPORT MODEL TO DETERMINE AERODYNAMIC EFFECTS OF FORWARD OR REVERSE THRUST.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
K. Aoyagi, and W. H. Tolhurst. Nov 64, 35p NASA-TM-X-1017

Descriptors: *Aerodynamic characteristics, *Delta wing, *Supersonic transport, *Thrust, *Wind tunnel model, Aerodynamic, Characteristics, Delta, Effect, Engine, Forward, Longitudinal, Low speed, Model, Mount, Operation, Pod, Reverse, Skin, Supersonic, Temperature, Transport, Tunnel, Wind, Wing.

For abstract, see STAR 05 18.
N67-32141 HC$3.00 MF$0.65

AERODYNAMIC CHARACTERISTICS OF A TAILLESS FIXED-WING SUPERSONIC TRANSPORT MODEL AT MACH NUMBERS FROM 1.80 TO 2.86.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
W. A. Corlett, and G. V. Foster. Aug 64, 46p NASA-TM-X-992

Descriptors: *Aerodynamic characteristics, *Supersonic transport, *Tailless aircraft, *Wing planform, Aerodynamic, Aircraft, Camber, Characteristics, Coefficient, Delta, Drag, Flat, Lateral, Lift, Longitudinal, Ogee, Planform, Ratio, Supersonic, Tailless, Transport, Trapezoidal, Trim, Tunnel, Twist, Wind, Wing.

For abstract, see STAR 05 18.
N67-32143 HC$3.00 MF$0.65

AERODYNAMIC CHARACTERISTICS OF A THREE-ENGINE SUPERSONIC TRANSPORT MODEL HAVING A LOW- ASPECT-RATIO VARIABLE-SWEEP WARPED WING.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
D. E. Fuller, and O. A. Morris. Sep 64, 61p NASA-TM-X-1011

Descriptors: *Aerodynamic characteristics, *Low aspect ratio wing, *Supersonic transport, *Variable sweep, Aerodynamic, Camber, Characteristics, Coefficient, Dihedral, Edge, Engine, Lateral, Leading, Lift, Longitudinal, Low aspect, Model, Nacelle, Ratio, Stability, Supersonic, Sweep, Tail, Three, Transport, Variable, Vertical, Warp, Wing.

For abstract, see STAR 05 18.
N67-32144 HC$3.00 MF$0.65

EFFECT OF WING PIVOT LOCATION ON LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF A VARIABLE SWEEP WING HAVING AN M PLANFORM.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
W. P. Henderson, and E. J. Ray. Oct 64, 39p NASA-TM-X-1022

Descriptors: *Aerodynamic characteristics, *Pivoted wing, *Variable sweep, *Wing planform, Aerodynamic, Angle of attack, Characteristics, Chord, Coefficient, Edge, Leading, Location, Longitudinal, M wing, Moment, Pitch, Pivot, Planform, Stability, Sweep, Theory, Variable, Vortex, Wing.

For abstract, see STAR 05 18.
N67-32145 HC$3.00 MF$0.65

FLIGHT TEST OF A 31.2-FOOT-DIAMETER MODIFIED RINGSAIL PARACHUTE DEPLOYED AT A MACH NUMBER OF 1.39 AND A DYNAMIC PRESSURE OF 11.0 POUNDS PER SQUARE FOOT.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
C. V. Eckstrom, H. N. Murrow, and J. S. Preisser. Aug 67, 45p NASA-TM-X-1414
Contract 709-08-00-D1-23
Film Supplement Number L-966 To This Report Is Available on Loan From Langley Res. Center

Descriptors: *Aerodynamic characteristics, *Flight test, *Parachute, Aerodynamic, Characteristic, Coefficient, Drag, Dynamic, Entry, Flight, Force, Mach number, Planetary, Pressure, Ring, Sáil, Test.

For abstract, see STAR 05 18.
N67-32265 HC$3.00 MF$0.65

FULL-SCALE WIND-TUNNEL INVESTIGATION OF A VTOL AIRCRAFT WITH A JET-EJECTOR SYSTEM FOR LIFT AUGMENTATION.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
D. H. Hickey, and J. V. Kirk. Nov 66, 51p NASA-TN-D-3725
Contract 721-01-00-08-21

Descriptors: *Aerodynamic characteristics, *Ejector, *Lift augmentation, *Vtol aircraft, *Wind tunnel stability test, Aerodynamic, Aircraft, Augmentation, Full, Jet, Lateral, Lift, Longitudinal, Scale, Stability, Stall, Static, System, Test, Thrust, Tunnel, Vtol, Wind, Wing.

For abstract, see STAR 05 18.
N67-32321 HC$3.00 MF$0.65

THEORETICAL DYNAMIC ANALYSIS OF THE LANDING LOADS ON A VEHICLE WITH A TRICYCLE LANDING GEAR.
National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
J. M. Mc Kay, and R. B. Noll. Aug 67, 33p NASA-TN-D-4075
Contract 719-01-00-04-24

Descriptors: *Dynamic load, *Landing gear, *Stress analysis, *X- 15 aircraft, Aircraft, Analysis, Calculation, Dynamic, Equation, Flight, Gear, Landing, Load, Simulation, Stress, Test, Theory, Tricycle.

For abstract, see STAR 05 18.
N67-32394 HC$3.00 MF$0.65

STUDY ON THE FEASIBILITY OF V/STOL CONCEPTS FOR SHORT HAUL TRANSPORT AIRCRAFT.
Lockheed-california Co., Burbank.
For primary bibliographic entry see Field 1B.
For abstract, see STAR 05 18.
N67-32478 HC$3.00 MF$0.65

WIND-TUNNEL INVESTIGATION AT MACH NUMBERS FROM 1.60 TO 2.86 OF THE STATIC AERODYNAMIC CHARACTERISTICS OF A SUPERSONIC TRANSPORT CONFIGURATION WITH VARIABLE-SWEEP WINGS EMPLOYING A DOUBLE INBOARD PIVOT.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
W. P. Henderson, and D. S. Shaw. 1962, 42p NASA-TM-X-745

Descriptors: *Aerodynamic characteristics, *Pivoted wing, *Supersonic transport, *Variable sweep, Aerodynamic, Aircraft, Characteristics, Chord, Double, Engine, Package, Pivot, Supersonic, Sweep, Test, Transport, Tunnel, Variable, Wind, Wing.

For abstract, see STAR 05 18.
N67-32553 HC$3.00 MF$0.65

AIRCRAFT DESIGN-INDUCED PILOT ERROR.
Civil Aeronautics Board, Washington, D. C. Bureau of Safety.
For primary bibliographic entry see Field 1B.
PB-175 629 HC$3.00 MF$0.65

SUPERPRESSURE BALLOONS FOR HORIZONTAL SOUNDINGS OF THE ATMOSPHERE.
National Center for Atmospheric Research, Boulder, Colo.
For primary bibliographic entry see Field 4A.
PB-175 658 HC$3.00 MF$0.65

1D. Aircraft Flight Control and Instrumentation

BOUNDARY LAYER CONTROL SYSTEM INSTALLATION FOR THE YCV-2B AIRPLANE.
Ryan Aeronautical Co San Diego Calif
For primary bibliographic entry see Field 1C.
AD-656 480 HC$3.00 MF$0.65

1E. Air Facilities

EVALUATION OF CENTERLINE-LIGHTING INDICATIONS FOR RUNWAY-DISTANCE REMAINING AND TAXIWAY EXITS.
Final rept.,
California Univ Berkeley Inst of Transportation and Traffic Engineering
D. M. Finch, R. Horonjeff, and K. Mellander. Jun 67, 38p
FAA-RD-67-10
Contract FAA/ARDS-434

Descriptors: (*Marker lights, *Runways), Fog signals, Visibility, Effectiveness, Tests, All-weather aviation, Taxiing, Colors.
Identifiers: Evaluation.

Tests were conducted in the FAA Fog Chamber to determine the effectiveness of colored centerline lights for indicating runway-distance remaining and for marking high-speed taxiway exits (large-radius turnoffs) under daytime and nighttime visibility conditions down to 700 ft of visual range. The tests consisted of observations by pilots of various lighting patterns under simulated rollout conditions. The results of the tests indicate that red centerline lights can be effectively used for indicating runway-distance remaining, either in combination with white lights or alone if the intensity of the red lights is high enough to provide adequate guidance under reduced visibility. The test results also indicate that under conditions of 700-ft visual range, adequate identification and guidance for large-radius taxiway turnoffs can be provided by steady-burning, green lights along the taxiway centerlines, with a pattern having an equivalent intensity at least that of 1000-cp lights at 12.5-ft spacing in daytime and 500 cp at 12.5 ft at night. Steady-burning taxiway lights were preferred by the pilots over flashing lights by a very wide margin. Taxiway centerline lights having a much wider beam than that specified by the FAA were visible from a point on the runway centerline farther beyond the beginning of the taxiway turnoff than were the specified narrower-beam lights. (Author)
AD-656 594 HC$3.00 MF$0.65

2. AGRICULTURE

2A. Agricultural Chemistry

INVESTIGATION OF SENSITIVITY OF FERTILIZER GRADE AMMONIUM NITRATE TO EXPLOSION.
Picatinny Arsenal Dover N J
For primary bibliographic entry see Field 19D.
AD-655 888 HC$3.00 MF$0.65

DETERMINATION OF AVAILABLE CARBOHYDRATES IN PLANT AND ANIMAL FOODS,
Colorado Univ Boulder Dept of Chemistry
For primary bibliographic entry see Field 6H.
AD-656 351 Not available from CFSTI.

2B. Agricultural Economics

A STUDY TO INVESTIGATE THE FEASIBILITY OF THE EXPANSION AND DIVERSIFICATION OF INTEGRATED CATTLE FEEDING AND BEEF PRODUCTION ON THE GILA RIVER INDIAN RESERVATION NEAR PHOENIX, ARIZONA.
Engineering-Science, Inc., Arcada, Calif.
Jul 67, 102p
Prepared in cooperation with Economic Development Administration, Washington, D. C.

Descriptors: (*Beef, Production), (*Economics, Arizona), Bovines, Feasibility studies, Population, Costs, Weight, Meat, Transportation, Periodic variations, Industries, Maps, Law, Commerce, Weather, Natural resources, Tables.

The report contains an investigation of the feasibility of the expansion and diversification of integrated cattle feeding and beef production on the Gila River Indian Reservation near Phoenix, Arizona. The agreement provided that the study be conducted in three phases, namely: An on-site examination of the Phoenix area feedlot and meat processing operation. A complete economic evaluation of the Arizona segment of the cattle feeder industry. An examination of the economic feasibility of establishing the facilities recommended in Phase II. It has been generally established that the Phoenix area enjoys certain natural and circumstantial advantages which can make it a favorable, possibly the most ideal, location in the southwest beef production system for maximum development and expansion of the beef industry, in keeping with demands of the close, large, flourishing market available. (Author)
PB-175 704 HC$3.00 MF$0.65

2D. Agronomy and Horticulture

THE ENERGY BUDGET AT THE EARTH'S SURFACE: PRELIMINARY WIND TUNNEL STUDIES OF THE PHOTOSYNTHESIS AND TRANSPIRATION OF FORAGE STANDS.
Agricultural Research Service Ithaca N Y Soil and Water Conservation Research Div
For primary bibliographic entry see Field 6C.
AD-655 910 HC$3.00 MF$0.65

EFFECT OF SOIL MOISTURE AND SOIL TEMPERATURE ON BLACK SHANK DISEASE DEVELOPMENT IN TOBACCO,
Fort Detrick Frederick Md
For primary bibliographic entry see Field 6C.
AD-656 551 Not available from CFSTI.

2E. Animal Husbandry

A STUDY TO INVESTIGATE THE FEASIBILITY OF THE EXPANSION AND DIVERSIFICATION OF INTEGRATED CATTLE FEEDING AND BEEF PRODUCTION ON THE GILA RIVER INDIAN RESERVATION NEAR PHOENIX, ARIZONA.
Engineering-Science, Inc., Arcada, Calif.
For primary bibliographic entry see Field 2B.
PB-175 704 HC$3.00 MF$0.65

2F. Forestry

A REPRODUCIBLE SYSTEM FOR EVALUATING FOREST FIRE RETARDANTS.
Southern Forest Fire Lab., Macon, Ga.
For primary bibliographic entry see Field 13L.
PB-175 570 HC$3.00 MF$0.65

AVAILABILITY OF YELLOW BIRCH LOGS TO SOUTHERN PISCATAQUIS COUNTY, STATE OF MAINE, 1966.
Sewall (James W.) Co., Old Town, Maine.
1966, 17p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Trees, Forestry), (*Economics, Maine), Transportation, Volume, Growth, Commerce, Roads, Vehicles, Railroads, Tables.
Identifiers: Area redevelopment.

The study determines the availability of yellow birch logs to six northern counties of Maine: Total estimates are given of log volumes in the six northern counties which produce eighty-five percent of the total volume: A tabulation is shown of total forest land and area upon which yellow birch survives and grows primarily.
PB-175 640 HC$3.00 MF$0.65

INVESTIGATING DOMINANCE IN DOUGLAS-FIR STANDS.
Research paper,
Pacific Northwest Forest and Range Experiment Station, Portland, Ore.
Kenneth W. Krueger. 1967, 14p PNW-43

Descriptors: (*Trees, Growth), Aging (Physiology), Forestry, Statistical functions.

Relationships between present height or d.b.h. of individual Douglas-firs to differences in age and competition were investigated in three stands. Small differences in time of establishment more than four decades ago were significantly related to present tree size. Based on correlation coefficients, competitors in these site III stands were best defined as trees nearer than 1.75D feet, where D is the competitor's d.b.h. in feet. Tree diameter was more sensitive to nearness of competitors and, in general, more closely correlated with competition than was height. (Author)
PB-175 656 HC$3.00 MF$0.65

SPIRAL GRAIN-A CAUSE OF POLE TWISTING.
Research paper,
Intermountain Forest and Range Experiment Station, Ogden, Utah.
Charles A. Wellner, and David P. Lowery. 1967, 22p RP-INT-38

Descriptors: (*Trees, *Wood), Physical properties, Forestry, Transmission lines, Specifications, Growth, Detection, Tables, Sampling, Tests.

The paper reports five studies of the relation of spiral grain to the twisting of western larch transmission poles. The first studied causes of poles poles' twisting in service. The second searched for practical means of detecting spiraling in unpeeled poles. The third surveyed frequency of occurrence of spiral grain in poles in four pole yards. The fourth investigated effects of altitude and stand density on spiral grain in pole-sized trees. The fifth experimentally studied effects of spiral grain on twisting. Dissecting sections of twisted poles revealed variations of spiraling within poles that resulted in counterbalancing of twisting forces. (Author)
PB-175 660 HC$3.00 MF$0.65

DENSITY AND HEIGHT GROWTH IN NATURAL SLASH PINE.
Research paper,
Southeastern Forest Experiment Station, Asheville, N. C.
Arthur B. Collins, III. May 67, 10p
RP-SE-27

Descriptors: (*Trees, *Growth), (*Forestry, Trees), Plants (Botany), Measurement, Wood pulp, North Carolina.

Three thinning treatments were applied to plots of 3-year-old natural slash pine with up to 50,000 seedling per acre. Measurements 14 years later prove height growth is reduced significantly in dense stands. For short pulpwood rotation, early thinning is imperative. It will also increase height and merchantable volume for later harvests. In dense, unthinned, natural stands, dominant height is not a true indicator of productive potential for a managed stand on the same site. (Author)
PB-175 694 HC$3.00 MF$0.65

3. ASTRONOMY AND ASTROPHYSICS

3A. Astronomy

RESEARCH DIRECTED TOWARD REFINEMENT OF GEODETIC TECHNIQUES UTILIZING TERRESTRIAL AND SPATIAL CONFIGURATIONS.
Final rept.,
Georgetown Coll Washington D C Observatory
Francis J. Heyden. 10 Jun 63, 33p
Contract AF 19 (604)-7203

Descriptors: (*Astronomy, Reports), Photographic plates, Rocket flares, Astronomical observatories, Camera lenses, Accuracy, Detectors, Transistors, Amplifiers, Gravity, Atmospheric refraction, Space navigation, Mathematical analysis, Rocket research, Terrestrial magnetism.

Contents: To carry out reductions of observations on photographic plates made in support of the Air Force Cambridge Research Center rocket-flare triangulation research; Provide instructions, guidance, and material support to co-operating astronomical observatories and amateur astronomers also participating in the rocket-flare research; The relative accuracy for different focal lengths of identical lens systems in astrographic cameras; The determination of atmospheric refraction from photographs of the sun taken at very low altitudes; The transistorized W. W. V. receiver; Complete the minutes of the gravity conference held at Georgetown; Selenographic studies; Analytical computation of orbits; Report on geomagnetism; Conversion of solar eclipse geodetic distances to DODWGS from AFWGS. (Author)
AD-655 933 HC$3.00 MF$0.65

ON THE DETECTION OF WATER ON THE MOON,
Cornell Univ Ithaca N Y Center for Radiophysics and Space Research
M. Werner, T. Gold, and M. Harwit. 2 Dec 66, 6p
AFOSR-67-1646
Contract AF 49 (638)-1527, Grant NSF-GP-1138
Availability: Published in Planet Space Sci v15 p771-4 1967.

Descriptors: (*Moon, Water), (*Atmosphere, Moon), Surface temperatures, Permafrost, Surface properties, Detection.

It has been suggested that a permafrost layer may exist beneath the surface of the Moon. If such a layer were present, H2O molecules would be outgassing from the lunar surface. These molecules could be detected by observations of fluorescent radiation from OH radicals produced from the H2O by radiative dissociation. It is shown that an outgassing rate from such a lunar permafrost layer as low as 3 x 10 to the 7th power molecules/cm-squared-sec could be detected from the surface of the Earth. (Author)
AD-655 977 Not available from CFSTI.

LUNAR OCCULTATION STUDIES OF FIVE WEAK RADIO SOURCES OF SMALL ANGULAR SIZE,
Cornell-Sydney Univ Astronomy Center Ithaca N Y
C. Hazard, S. Gulkis, and A. D. Bray. 5 Dec 66, 22p
AFOSR-67-1730
Contract AF 49 (638)-1156
Availability: Published in The Astrophysical Journal v148 n3 Pt1 p669-87 Jun 1967.

Descriptors: (*Extraterrestrial radio waves, Sources), Position finding, Astronomical observatories, Radio astronomy, Moon, Binary stars.
Identifiers: Redshift, Occultation, Quasars.

This paper describes the investigation of five small-angular-size sources based on occultation observations made with the 1000-foot steerable telescope at Arecibo. All the sources contain structure and at least three appear to possess a double structure similar to that of 3C273. Only one source reveals no evidence of resolution or of complex structure, and for this source only one occultation curve was observed. Identifications proposed for four of the five sources investigated, but for the remaining source there is no object within the plate limits near the source position. All objects are faint, three being close to the plate limits with a magnitude 20. It is suggested that all are probably quasi-stellar radio sources, a suggestion which is supported by the recent measurement of the redshift (z=1.47) of the brightest of the new identifications. It appears probable that the remaining sources are at even greater distances. The extension of the observations to fainter sources, which will soon be possible using a new telescope feed now under construction, should permit an investigation of the structure of objects with redshifts in excess of 2, when a test of certain classes of cosmology should then become feasible. (Author)
AD-655 988 Not available from CFSTI.

AN EXPERIMENTAL STUDY OF 'TAYLOR COLUMNS'.
Technical rept.,
Woods Hole Oceanographic Institution Mass
R. Hide, and A. Ibbetson. 3 Sep 65, 15p Rept no. WHOI-Ref-67-29, WHOI-Contrib-1713
Contract Nonr-2196 (00)
Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge, Dept. of Geology and Geophysics, Scientific-10.
Availability: Published in ICARUS v5 n3 p279-90 May 1966.

Descriptors: (*Jupiter (Planet), *Hydrodynamics), Geophysics, Visibility, Rotation, Terrain, Atmosphere, Theory, Fluid flow, Motion.

According to the 'Taylor column' hypothesis of Jupiter's Great Red Spot, the planet rotates so rapidly that hydrodynamical disturbances at great depths within his atmosphere, possibly due to a 'topographical feature' of the surface underlying the atmosphere, can, provided that their horizontal dimensions are sufficiently large, penetrate upward as far as the visible surface. Hence, the theoretical and experimental investigation of 'Taylor columns' described in this paper might bear on processes occurring in Jupiter's atmosphere. Simple theoretical arguments suggest that for Taylor columns to arise in a homogeneous, inviscid, incompressible fluid that rotates uniformly about the z axis of coordinates of a Cartesian system, the ratio of the linear dimension in the z direction of the 'topographical feature' to that of the fluid container must exceed a Rossby number based on the relative hydrodynamical flow velocity, on the linear dimensions in the x and y directions of the 'topographical' feature, and on the basic rotation rate of the system, multiplied by a number of order unity. Systematic experiments have been carried out on Taylor columns produced by moving solid objects through a liquid in a rotating cylindrical tank. They show that the theoretical criterion is probably correct, and indicate how it is affected by viscosity. (Author)
AD-656 027 Not available from CFSTI.

SOLAR RESEARCH AND INSTRUMENTATION PROGRAMS AT SACRAMENTO PEAK OBSERVATORY AND HIGH ALTITUDE OBSERVATORY.
Final rept. 1 Mar 64-31 Dec 66,
Sacramento Peak Observatory Sunspot N Mex
Robert L. Shutt, and D. Keith Watson. 22 Jun 67, 21p
AFCRL-67-0390
Contract AF 19 (628)-4078
Prepared in cooperation with High Altitude Observatory, Boulder, Colo.

Descriptors: (*Sun, Scientific research), (*Data processing systems, Sun), (*Optical instruments, Sun), (*Jupiter (Planet), Radio astronomy), Astronomical observatories, Input-output devices, Diffraction gratings, Resolution, Solar radiation, Chromosphere, Solar flares, Infrared photography.
Identifiers: Spectrographs, On-line systems.

For several years the staff of the Sacramento Peak Observatory concentrated on the development of new instruments and data acquisition systems for solar research. Discussed in some detail are the opto-mechanical design features of the six-channel universal spectrography now in operation at Sacramento Peak. Brief descriptions of solar research programs at Sacramento Peak Observatory and the High Altitude Observatory are also given. (Author)
AD-656 425 HC$3.00 MF$0.65

OBSERVATIONS OF THE INTERPLANETARY MAGNETIC FIELD JULY 4-12, 1966.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 05 18.
N67-31549 HC$3.00 MF$0.65

EARLY RESULTS FROM THE MAGNETIC FIELD EXPERIMENT ON LUNAR EXPLORER 35.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 05 18.
N67-31810 HC$3.00 MF$0.65

RESULTS OF A SOUNDING ROCKET EXPERIMENT TO STUDY CELESTIAL X-RAY SOURCES FINAL REPORT.
American Science and Engineering, Inc., Cambridge, Mass.
R. Giacconi, P. Gorenstein, H. Gursky, and J. R. Waters. Jun 67, 37p NASA-CR-85787, ASE-1637
Contract NASW-1535

Descriptors: *Aerobee rocket, *Crab nebula, *Sounding rocket, *X-ray, Crab, Emission, Nebula, Payload, Radiation, Radio, Rocket, Sounding, Source.

For abstract, see STAR 05 18.
N67-31860 HC$3.00 MF$0.65

ASTROGEOLOGIC STUDIES. PART A - LUNAR AND PLANETARY INVESTIGATIONS ANNUAL PROGRESS REPORT, 1 JUL. 1965 - 1 JUL. 1966.
Geological Survey, Washington, D. C.
Dec 66, 417p NASA-CR-86649
NASA ORDER R-66

Descriptors: *Astronomical photography, *Lunar geology, *Mapping, *Morphology, *Photograph interpretation, *Planetary environment, *Stratigraphy, Astronomical, Crater, Distribution, Effect, Energy, Environment, Fault, Geology, Heat, History, Interpretation, Lunar, Mechanics, Method, Moire method, Night, Origin, Photograph, Photography, Photometry, Planetary, Prediction, Quadrangle, Radiative, Seismic, Theory, Transfer, Volcanic.

For abstract, see STAR 05 18.
N67-31934 HC$3.00 MF$0.65

3B. Astrophysics

THE STABILITY OF CONTINUALLY CREATED MASS AGAINST GRAVITATIONAL DECAY,
Cornell Univ Ithaca N Y Center for Radiophysics and Space Research
For primary bibliographic entry see Field 20H.
AD-655 918 HC$3.00 MF$0.65

THE METHOD FOR ABUNDANCE ANALYSIS. II. ON THE CURVE-OF-GROWTH METHOD,
California Univ Los Angeles
Lawrence H. Aller. 1967, 15p
AFOSR-67-1655
Grant AF-AFOSR-83-63
Prepared for presentation at Symposium on Abundance Determinations in Stellar Spectra (26th).
Availability: Published in Astronomical Papers v4 n19 p99-111 1967.

Descriptors: (*Stars, Atmosphere models), (*Isotope availability, Stars), Astrophysics, Analysis, Plasma medium, Temperature, Absorption spectrum, Spectra (Visible + ultraviolet), Line spectrum.
Identifiers: Curve-of-growth method.

This paper reviews the development of curve-of-growth techniques for stars of different classes and their atmospheres. Also identified are several approaches that have served usefully to reduce computation time requirements for computers when considerable choice is initially available in the representation to be used for the data available. The principal emphasis is on the interplay of mean stellar temperature not mean electron pressure. (Author)
AD-655 961 Not available from CFSTI.

ORBITS IN THE COPENHAGEN PROBLEM ASYMPTOTIC AT L4, AND THEIR GENEALOGY,
Yale Univ New Haven Conn Observatory
For primary bibliographic entry see Field 22C.
AD-655 963 Not available from CFSTI.

SOLAR MODULATION AND THE ENERGY DENSITY OF GALACTIC COSMIC RAYS,
Chicago Univ Ill Enrico Fermi Inst for Nuclear Studies
G. Gloeckler, and J. R. Jokipii. 24 Feb 67, 9p
AFOSR-67-1723
Contract AF 49 (638)-1642, Grant NsG-179-61
Availability: Published in The Astrophysical Journal v148 pL41-6 Apr 1967.

Descriptors: (*Cosmic rays, *Interstellar matter), (*Particle trajectories, Cosmic rays), Sun, Energy, Solar disturbances, Astronomical data, Space environmental conditions.
Identifiers: Solar modulation.

Present knowledge permits the residual solar modulation of cosmic rays in 1965 to be expressed in terms of only one undetermined constant which expresses the magnitude of modulation. A firm upper bound is placed on this parameter by considering the local interstellar cosmic-ray energy density. (Author)
AD-655 974 Not available from CFSTI.

LUNAR OCCULTATION STUDIES OF FIVE WEAK RADIO SOURCES OF SMALL ANGULAR SIZE,
Cornell-Sydney Univ Astronomy Center Ithaca N Y
For primary bibliographic entry see Field 3A.
AD-655 988 Not available from CFSTI.

ASTROPHYSICAL PROBLEMS,
California Inst of Tech Pasadena
T. A. Tombrello. 1967, 18p
Contract Nonr-220 (47)
Presented at the Symposium on Nuclear Physics Research with Low Energy Accelerators, University of Maryland, June 19-24 1967.
Availability: Published in Lemon AID Preprint Series in Nuclear Physics 18p Jun 1967.

Descriptors: (*Stars, *Nuclear reactions), (*Protons, Nuclear reactions), Proton scattering, Alpha particles, Positrons, Neutrinos, Nuclear cross sections, Temperature, Astrophysics, Beta decay, Beryllium, Helium, Nuclear models, Wave functions, Sun.
Identifiers: Proton-proton chain reactions.

The paper discusses the proton-proton chain reactions as an example of the application of nuclear physics in understanding one stellar mechanism. In this reaction, four protons are eventually converted to an alpha particle, two positrons, and two neutrinos with a total energy release of 26.7 MeV. The final section considers the p-p chain and neutrino astronomy.
AD-656 150 Not available from CFSTI.

THE LINEAR THEORY: INITIATION OF PULSATIONAL INSTABILITY IN STARS,
Colorado Univ Boulder Dept of Physics
John P. Cox. 1967, 77p
AROD-4445:84
Contract DA-31-124-ARO (D)-139, Grant NSF-GP-4859
Research supported in part by ARPA Proj. DEFENDER, ARPA Order-0492, and AEC.
Availability: Published in Symposium (28th) on Aerodynamic Phenomena in Stellar Atmospheres 77p 1967.

Descriptors: (*Variable stars, Stability), Periodic variations, Gravity, Mathematical models, Brightness, Turbulence, Thermal radiation, Heat transfer, Temperature, Nuclear energy, Convection (Heat transfer), Viscosity, Oscillation.
Identifiers: Wave equation.

The primary purpose of this paper is to survey the author's understanding of the present status of thinking on the basic physical mechanisms which may induce instability in a star against purely radial, infinitely small oscillations. The following topics are discussed: equations for spherically symmetric radial motion, results for linear adiabatic radial oscillations, linear non-adiabatic radial oscillations and pulsational stability, the mathematical problem of linear, non-adiabatic radial pulsations, factors affecting pulsational stability, and envelope ionization mechanisms as a cause of pulsational instability. (Author)
AD-656 214 Not available from CFSTI.

THE TWILIGHT ATMOSPHERE OF VENUS,
Rand Corp Santa Monica Calif
G. F. Schilling, and R. C. Moore. Jul 67, 97p
Rept no. RM-5386-PR
Contract F44620-67-C-0045

Descriptors: (*Venus (Planet), Twilight), (*Planetary atmospheres, Venus (Planet)), Anomalies, Cloud cover, Scattering, Optical properties, Brightness, Geometry, Predictions, Sky brightness, Mathematical analysis, Atmosphere models.
Identifiers: Occultation.

An investigation of the discrepancies between the theoretically predicted and the actually observed shape and periodic appearance of Venus. Current astronomical methods of observation of the twilight sky of Venus are investigated by combining a rigorous celestial geometry with a determination of the physical effects exerted by the relative luminances of the atmospheres of Venus and the Earth. Analysis shows that the discrepancy between the expected and observed times of dichotomy corresponds to a range in position angle from about 92 to 98 degrees, which implies a minimum height of the effectively scattering atmosphere from 13 to 23 km. There are indications that the true height may be several tens of kilometers.
AD-656 307 HC$3.00 MF$0.65

RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Columbia Radiation Lab New York
For primary bibliographic entry see Field 9C.
AD-656 618 HC$3.00 MF$0.65

GRAVITATION IN FLAT SPACE-TIME,
Defence Research Telecommunications Establishment Ottawa (Ontario)
For primary bibliographic entry see Field 20J.
AD-656 675 Not available from CFSTI.

SOLAR FLARE PATROL AND PREDICTION.
ATD work assignment no. 101,
Library of Congress Washington D C Aerospace Technology Div
Daniel W. Michaels. 22 Aug 67, 40p Rept no.
ATD-67-34
TT-67-62551
Rept. on Surveys of Foreign Scientific and Technical Literature.

Descriptors: (*Solar flares, Predictions), (*Solar disturbances, Predictions), (*Ionospheric disturbances, Solar disturbances), Solar radiation, Sunspots, Radio astronomy, Cosmic rays, Magnetic fields, Chromosphere, Upper atmosphere, Solar corona, USSR.

This report reviews recent Soviet literature concerning Soviet solar flare patrol and prediction capabilities, including organizational structure, observatory distribution, instrumentation, and forecasting techniques.
AD-656 703 HC$3.00 MF$0.65

RESEARCH DIRECTED TOWARD THE OBSERVATION AND INTERPRETATION OF SOLAR PHENOMENA.
Final rept. 1 Mar 64-30 Apr 67,
Harvard Coll Observatory Cambridge Mass Solar Dept
Barbara Bell, Howard L. DeMastus, and Donald H. Menzel. May 67, 33p
AFCRL-67-0346
Contract AF 19 (628)-3322

Descriptors: (*Solar disturbances, *Ionospheric disturbances), (*Sun, Scientific research), Sunspots, Moon, Solar flares, Solar corona, Line spectrum, Magnetohydrodynamics, Solar spectrum, Solar atmosphere, Magnetic fields.

The first section describes research at Harvard in the following major categories: (1) Solar-terrestrial studies, relating geomagnetic distrubances and shortwave radio fadeouts to aspects of solar activity, and investigating a possible influence of phase of the moon upon solar-terrestrial correlations. (2) Analysis of solar observations made at Sacramento Peak and elsewhere of prominences, sunspots, and the green coronal line. (3) Theoretical studies in magnetohydrodynamics, leading toward development of a model for sunspots; and in atomic theory, on the intensities of spectral lines for improved interpretation of the solar spectrum. The second section reviews the operation at Sacramento Peak of the optical solar patrols of flares in the light of H alpha, of sun spots in white light, and of the coronal emission lines. The calibration of the coronal spectrograph is discussed, and the Sacramento Peak scale compared to that used at other observatories. A cooperative effort, begun in 1964, between the Harvard patrol group at Sacramento Peak and the USAF Air Weather Service is described, including a training course program.
AD-656 751 HC$3.00 MF$0.65

SOLAR RADIATION AND ATMOSPHERIC ABSORPTION IN THE MM WAVE REGION.
California Univ Berkeley Space Sciences Lab
For primary bibliographic entry see Field 4A.
AD-656 754 HC$3.00 MF$0.65

AN ISOPHOTOMETRICAL STUDY OF WIGGLES IN THE SOLAR IRON LINES,
Oslo Univ (Norway) Inst of Theoretical Astrophysics
Einar Haugen. 1967, 35p Rept no. Scientific-14 (63)
AFCRL-67-0354
Contract AF 61 (052)-743

Descriptors: (*Solar atmosphere, Anomalies), (*Line spectrum, Iron), Doppler effect, Solar spectrum, Solar corona, Chromosphere, Turbulence, Stability, Optical properties.
Identifiers: Solar photosphere.

Marked asymmetries are observed in the profiles of moderately strong and weak iron lines near the centre of the solar disk. These asymmetries are shown to vary strongly from point to point on the sun. The properties of the asymmetries are discussed. The observations show that large scale irregularities of the order of 100,000 km may be present in the solar photosphere. Comparison of simultaneous observation of lines of different intensity indicates that the lines are shifted relative to each others, in the sense that the stronger lines are shifted more to the red than the weaker ones. This difference between weak and moderately strong lines have been found in spectra obtained at two different observatories. If the difference in line shift between different lines is interpreted as doppler shift, velocities up to 1 km/sec are found. (Author)
AD-656 770 HC$3.00 MF$0.65

HIGH-ENERGY SOLAR X-RAYS OF 7 JULY 1966.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
T. L. Cline, S. S. Holt, and E. W. Hones, Jr.. Jul 67, 15p NASA-TM-X-55846, X-611-67-348

Descriptors: *Ogo, *Solar x-ray, *X-ray spectrometry, Bremsstrahlung, Differential, Electron, Emission, Energy, Flare, History, Intensity, Microwave, Nonthermal, Optical, Origin, Solar, Spectrometry, Spectrum, Time, X-ray.

For abstract, see STAR 05 18.
N67-31542 HC$3.00 MF$0.65

ON SOME MODELS OF ZODIACAL CLOUD.
Volt Technical Corp., Washington, D. C.
N. B. Divari. 20 Jun 67, 10p NASA-CR-86679, ST-IM-CG-10625
Contract NAS5-12487
Transl. Into English From Astron. Vestn., V. 1, No. 2, 1967 P 103-109

Descriptors: *Astronomical model, *Zodiacal dust cloud, Astronomy, Brightness, Calculation, Cloud, Comet, Dependence, Distance, Dust, Eclipse, Function, Heliocentricity, Inclination, Latitude, Meteor, Model, Orbit, Particle, Polarization, Sun, U.S.S.R., Zodiac.

For abstract, see STAR 05 18.
N67-31987 HC$3.00 MF$0.65

STUDIES IN COMETARY ASTROPHYSICS FINAL REPORT, 19 MAY 1965 - 18 MAY 1967.
Melpar, Inc., Falls Church, Va.
V. J. De Carlo. 18 May 67, 76p NASA-CR-86551
Contract NASW-1417

Descriptors: *Astrophysics, *Comet, *Hydrogen atom, *Molecular interaction, *Optical spectrum, *Photolysis, Absorption, Acetylene, Activity, Argon, Atom, Carbide, Carbon, Chemistry, Cyanogen, Decomposition, Electron, Emission, Excitation, Gas, Hydrazine, Hydrogen, Interaction, Methane, Methyl, Molecular, Optical, Peroxide, Photochemistry, Physics, Single, Spectrum, Ultraviolet, Vacuum, Vibration.

For abstract, see STAR 05 18.
N67-32289 HC$3.00 MF$0.65

SOMETHING NEW ABOUT VENUS.
Volt Technical Corp., Washington, D. C.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 05 18.
N67-32308 HC$3.00 MF$0.65

INTERPLANETARY SECTOR STRUCTURE, 1962 - 1966.
California Univ., Berkeley. Space Science Lab.
N. F. Ness, and J. M. Wilcox. 4 May 67, 20p NASA-CR-86947
Grant NSG-243, Contract NONR-3656/26/
Its Ser. No. 8, Issue No. 40

Descriptors: *Imp, *Interplanetary magnetic field, Field, Interplanetary, Magnetic, Pattern, Property, Satellite, Sector, Spacecraft, Structure.

For abstract, see STAR 05 18.
N67-32318 HC$3.00 MF$0.65

SOME ASPECTS OF THE CIRCULATION OF MARS.
Rand Corp., Santa Monica, Calif.
C. Leovy. Nov 65, 27p NASA-CR-86912, P-3262
Contract NASR-21/07/
Presented At Conf. on Exploration of the Planets, Blacksburg, Va., 16-20 Aug. 1965

Descriptors: *Heat balance, *Mars atmosphere, *Planetary temperature, *Temperature distribution, Atmosphere, Balance, Circulation, Differential, Distribution, Diurnal, Earth, Flux, Heat, Mars, Planetary, Solstice, Summer, Temperature, Thermal, Tide, Vertical, Winter.

For abstract, see STAR 05 18.
N67-32494 HC$3.00 MF$0.65

ON THE POSSIBILITY OF REFINING BY MEANS OF OPTICAL LOCATION SOME ASTRONOMICAL PARAMETERS OF THE SYSTEM - EARTH- MOON.
Volt Technical Corp., Washington, D. C.
N. S. Chernykh, YU. L.Kokurin, V. V. Kubasov, V. F. Lobanov, and A. N. Sukhanovskiy. 22 Jun 67, 9p NASA-CR-86680, ST-CM-OA-LPS-10627
Contract NAS5-12487
Transl. Into English From Kosmich. Issled. (Moscow), V. 5, No. 2, 1967 P 219-224

Descriptors: *Earth-moon system, *Reflector, Astronomy, Earth, Eccentricity, Ephemeris, Error, Lunar, Mathematics, Moon, Orbit, Selenography, Surface, System, Time, U.S.S.R..

For abstract, see STAR 05 18.
N67-32509 HC$3.00 MF$0.65

VENUS - PRELIMINARY SCIENCE OBJECTIVES AND EXPERIMENTS FOR USE IN ADVANCED MISSION STUDIES.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
R. G. Brereton. 22 Dec 65, 57p NASA-CR-75609, EPD-328
Contract NAS7-100

Descriptors: *Experiment design, *Mission planning, *Venus probe, Atmosphere, Biology, Composition, Design, Experiment, Field, Flyby, Mariner spacecraft, Mission, Objective, Particle, Planning, Probe, Science, Venus.

For abstract, see STAR 05 18.
N67-32630 HC$3.00 MF$0.65

3C. Celestial Mechanics

ROCKET INSTRUMENTATION FOR SOLAR ECLIPSE MEASUREMENTS - 12 NOVEMBER 1966,
Utah Univ Salt Lake City Upper Air Research Labs
Karl G. Seljaas, and David A. Burt. Apr 67, 88p Rept no. Scientific-2, UU67-2
AFCRL-67-0336
Contract AF 19 (628)-5044

Descriptors: (*Rockets, *Instrumentation), (*Solar eclipses, Measurement), Atmosphere, Electron density, Ionosphere, Payload, Ions, Mass spectroscopy, Spectrum analyzers, Langmuir probes, Calibration, Tables, Circuits, Telemeter systems, Design, Measurement, Voltage.

The report details instrumentation designed to measure the parameters in the D-region of the ionosphere during a total solar eclipse. Four Nike-Hydac rockets were fired from Cassino, Brazil, in connection with the eclipse of 12 November 1966; a test flight round was flown on 5 November, and the remaining three rockets were fired during various phases of the eclipse on 12 November. The rocket payloads were identical and were designed to measure the following parameters: Positive ion composition, Positive ion density, Positive ion energy distribution, X-ray flux, Lyman-alpha radiation, Electron density, Electron temperature. (Author)
AD-656 342 HC$3.00 MF$0.65

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4. ATMOSPHERIC SCIENCES

4A. Atmospheric Physics

A STUDY OF TELEMETRY SYSTEMS FOR GUN LAUNCHED UPPER ATMOSPHERE PROBES,
National Research Council of Canada Ottawa (Ontario) Div of Radio and Electrical Engineering
For primary bibliographic entry see Field 9F.
AD-655 874 Not available from CFSTI.

A COSMIC RAY PROGRAM FOR THE STUDY OF STRONG INTERACTION PHYSICS IN THE RANGE OF 100-1000 GeV,
Michigan Univ Ann Arbor Dept of Physics
For primary bibliographic entry see Field 14B.
AD-655 908 HC$3.00 MF$0.65

THE ENERGY DEPENDENCE OF THE FRAGMENTATION PARAMETERS AND MEAN FREE PATHS OF COSMIC RAY NUCLEI WITH Z GREATER THAN OR EQUAL TO 10 (+),
Minnesota Univ Minneapolis Cosmic Ray Group
T. F. Cleghorn, P. S. Freier, and C. J. Waddington. 1967, 14p Rept no. CR-98
Contract Nonr-710 (60)
Contrib-OG-VII-54 to Cosmic Ray Conf. (10th), Calgary.

Descriptors: (*Cosmic rays, Particle trajectories), Upper atmosphere, Canada, India, Nuclear reactions, Balloons, Nuclear models, Energy.
Identifiers: Mean free path.

The fragmentation parameters and interaction mean free paths for VH and H-type cosmic ray nuclei have been measured as functions of energy in nuclear emulsions. It is found that they are essentially independent of energy over the range

from 100 MeV/n to 30 GeV/n. The mean free paths of the secondary nuclei produced in observed interactions have also been measured. With two major exceptions, the values of the mean free paths are found to be consistent with an overlap model for nuclear interactions. The value obtained for the secondary L-type nuclei appears to be significantly shorter than that expected from the model calculations while that for the primary VH nuclei appears to be significantly longer. (Author)
AD-656 046 HC$3.00 MF$0.65

SATELLITE OBSERVATIONS OF PARTICLE FLUXES AND ATMOSPHERIC EMISSIONS,
Rice Univ Houston Tex Dept of Space Science
For primary bibliographic entry see Field 20H.
AD-656 250 Not available from CFSTI.

ROCKET INSTRUMENTATION FOR SOLAR ECLIPSE MEASUREMENTS - 12 NOVEMBER 1966,
Utah Univ Salt Lake City Upper Air Research Labs
For primary bibliographic entry see Field 3C.
AD-656 342 HC$3.00 MF$0.65

THE ABSORPTION OF X-RAYS BY INTERSTELLAR GAS,
Queen's Univ Belfast (Northern Ireland) Dept of Applied Mathematics
K. L. Bell, and A. E. Kingston. 31 Jan 67, 4p
Contract N62558-4297
Availability: Published in Mon. Not. R. Astr. Soc. v136 p241-2 1967.

Descriptors: (*X rays, *Absorption), (*Gas ionization, *Quantum mechanics), Hydrogen, Bremsstrahlung, Helium, Rockets, Tables, Atomic properties, Neon, Theory.

The photo-absorption cross section of soft X-rays by interstellar gas is calculated using accurate photo-ionization cross sections together with the currently accepted composition of the gas. It is shown that the neon K edge is a distinctive feature of this spectrum even if all the interstellar hydrogen is in molecular form. (Author)
AD-656 352 Not available from CFSTI.

INSTRUMENTATION AND TECHNIQUES FOR UPPER ATMOSPHERE MEASUREMENTS.
Final rept. 15 May 65-14 May 67,
Control Equipment Corp Needham Heights Mass
Harry E. Adams. 1 Jun 67, 12p
AFCRL-67-0371
Contract AF 19 (628)-5147

Descriptors: (*Upper atmosphere, Measurement), Instrumentation, Density, Barometric pressure, Temperature, Atmospheric motion, Ionization gages, Calibration, Spectrometers, Design, Sensors, Amplifiers, Geophysics, Reaction kinetics, Mass spectroscopy, Spectrum analyzers.

Instruments and techniques for the measurement of the density, pressure, and temperature of the earth's upper atmosphere and for the determination of the reaction kinetics of atmospheric gases have been developed jointly by contractor and AFCRL. Engineering drawings, techniques, and experimental results have been documented directly by AFCRL. (Author)
AD-656 393 HC$3.00 MF$0.65

THE ENERGY SPECTRUM OF THE Z > OR-20 COMPONENT OF THE COSMIC RADIATION.
Technical rept.,
Minnesota Univ Minneapolis Cosmic Ray Group
P. S. Freier, and C. J. Waddington. Jun 67, 16p
Rept no. CR-99
Contract Nonr-710 (60)
Contribution of Cosmic Ray Conf. (10th), Calgary (Canada) nv. OG-VII-55.

Descriptors: (*Meteorological balloons, Cosmic rays), (*Cosmic rays, Symposia), Energy, Measurement, Calcium, Intensity, Acceleration, Ionization, Kinetic energy, Nucleons, Balloons, Flight paths, Tables.

Three large stacks of nuclear emulsions were exposed during 1964-1966 on high altitude balloons launched from Fort Churchill, Canada; Texas, U.S.A.; and Hyderabad, India. These stacks have been used to study the energy spectrum of the cosmic ray nuclei of calcium and heavier, the so-called VH-nuclei. These measurements result in integral intensity values for energies greater than 7.1, 1.58 and 1.00 GeV per nucleon, together with differential intensities over the range 225 less than E less than 1000 MeV per nucleon. Differential intensities were also found for lighter nuclei over varying energy ranges. The differential spectrum observed has a maximum value of about 0.0016 nuclei/sq m ster. sec. MeV per nucleon around E approximately equals 350 MeV per nucleon and falls off at both higher and lower energies. These values are based on the observation of a total of some 1600 VH-nuclei. The energy spectrum has been compared with that observed at similar times for the helium nuclei in order to study the influences of ionization energy losses during propagation of these high Z nuclei. These observations are interpreted as implying that if the source spectra of the VH-nuclei and the helium nuclei are similar then the VH-nuclei have traversed less than 1 g/sq cm of matter while ionization energy loss has been the dominant acceleration term. (Author)
AD-656 432 HC$3.00 MF$0.65

THE CHARGE DISTRIBUTION OF THE ENERGETIC VERY HEAVY NUCLEI IN THE PRIMARY COSMIC RADIATION.
Technical rept.,
Minnesota Univ Minneapolis Cosmic Ray Group
O. Mathiesen, C. E. Long, P. S. Freier, and C. J. Waddington. 1967, 15p Rept no. CR-100
Contract Nonr-710 (60)
Contribution of Cosmic Ray Conf. (10th) Calgary (Canada), nv. OG-VII-56.

Descriptors: (*Meteorological balloons, Cosmic rays), (*Cosmic rays, Symposia), Densitometers, Charged particles, Atmosphere, Sulfur, Argon, Calcium, Atomic properties, Tables, Acceleration, Kinetic energy.

A fully digitized, semi-automated photodensitometer has been employed to study the detailed charge composition of primary cosmic ray nuclei having Z less than 16 detected in a stack of nuclear emulsions flown from Hyderabad, India under approximately 4g/sq cm of residual atmosphere. One hundred and twenty nuclei heavier than phosphorus have been analyzed. These nuclei all had energies exceeding 7.1 GeV per nucleon and have had their charges measured with an accuracy estimated to be plus or minus 0.4 of a unit charge. It has consequently been possible to resolve the individual charges and to determine the elemental abundances. The observed charge distribution has been corrected to the top of the atmosphere and compared with various cosmological abundance compilations. After deriving values for the fragmentation parameters in hydrogen, it is concluded that the data are consistent with the charge distribution predicted if an initially pure example of iron nuclei had traversed some 4 g/sq cm of matter since the initial acceleration. The cosmologically abundant elements sulphur, argon and calcium appear to be relatively absent from the source, while nickel is only present with the predicted abundance. (Author)
AD-656 433 HC$3.00 MF$0.65

A REVIEW OF SEVEN PAPERS CONCERNING THE MEASUREMENT OF TEMPERATURE IN THE STRATOSPHERE AND MESOSPHERE,
Atmospheric Sciences Lab White Sands Missile Range N Mex
Harold N. Ballard. May 67, 82p
ECOM-5125

Descriptors: (*Atmospheric temperature, *Stratosphere), (*Mesosphere, Atmospheric temperature), Heat transfer, Energy, Sounding rockets, Atmospheric sounding, Sensors, Thermistors, Solar radiation, Measurement.

Seven papers concerning the measurement of atmospheric temperature between the altitudes of 30 and 60 km were chosen for study. The spherical bead thermistor serves as the temperature sensing element in each case. The heat transfer equations which are common to all treatments are discussed. Each paper is then considered, giving the physical characteristics of each instrument and the values chosen by each investigator for the various heat transfer parameters. The resulting rates of energy transfer for each heat transfer process, as applicable to a particular instrument at 60 km, are listed with the corresponding temperature corrections. The total corrections to the temperature at 60 and 50 km are also listed. The conclusions of each investigator, as stated by the investigator, are included. A summary of all results is then presented. The correction values, as determined by each investigator, are arranged in tabular form so that they may be compared. In cases where the comparison indicates that there is a major difference in the value of a particular quantity, an opinion is given for the cause of the difference. (Author)
AD-656 461 HC$3.00 MF$0.65

COMPUTER-ADMINISTERED INSTRUCTION VERSUS TRADITIONALLY ADMINISTERED INSTRUCTION: ECONOMICS,
George Washington Univ Alexandria Va Human Resources Research Office
For primary bibliographic entry see Field 5I.
AD-656 613 HC$3.00 MF$0.65

ON THE ENERGY FLUXES OF LOW-ENERGY PROTONS AND POSITIVE IONS IN THE EARTH'S INNER RADIATION ZONE,
Iowa Univ Iowa City Dept of Physics and Astronomy
L. A. Frank, and R. L. Swisher. Jun 67, 15p Rept no. 67-33
Contract Nonr-1509 (06), Grant NsG-62-233

Descriptors: (*Magnetosphere, Van Allen Radiation Belt), (*Protons, Magnetosphere), Exosphere, Ions, Aurorae, Radiation measurement systems, Scientific satellites, Upper atmosphere, Cosmic rays.

A search for the large energy fluxes of low-energy protons or positive ions (500 eV approximately equal, or < E approximately equal, or < 1 MeV) in the earth's inner radiation zone as previously reported by Freeman via the analysis of the responses of CdS crystals borne on the earth-satellite Injun 1 is reported here utilizing recent measurements of energy fluxes of protons and positive ions within the energy range 100 eV to 4.2 MeV with earth-satellites OGO 3 and Injun 4. These recent measurements provide upper limits for these proton and positive-ion energy fluxes which are less by factors of approximately 10 to 100 when compared to the Injun 1 observations during 1961. The upper limits reported here strongly indicate that large energy fluxes of low-energy protons or positive ions, approximately 50 ergs/cm squared-sec-sr, are not a feature of the inner radiation zone. (Author)
AD-656 627 HC$3.00 MF$0.65

REACTION OF N2 (A (3)SIGMA-u (+)) WITH ATOMIC NITROGEN,
Stanford Research Inst Menlo Park Calif
For primary bibliographic entry see Field 7D.
AD-656 667 Not available from CFSTI.

MOLECULAR LEVEL-CROSSING SPECTROSCOPY: THE g VALUE FOR AN EXCITED STATE OF NITRIC OXIDE,
Joint Inst for Lab Astrophysics Boulder Colo
For primary bibliographic entry see Field 7D.
AD-656 669 Not available from CFSTI.

SOLAR FLARE PATROL AND PREDICTION.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 3B.
AD-656 703 HC$3.00 MF$0.65

DYNAMIC EVALUATION OF RADAR AND PHOTO TRACKING SYSTEMS,
Atmospheric Sciences Lab White Sands Missile Range N Mex
Walter B. Miller, and Henry Rachele. May 67, 25p
ECOM-5128

Descriptors: (*Meteorological radar, Stochastic processes), (*Atmospheric motion, Mathematical analysis), Radar tracking, Wind, Meteorological balloons, Analysis of variance, Geometry, Meteorological parameters, Scientific research.

Use of radar and multiple phototheodolites for obtaining wind velocity data has become common at WSMR in recent years. These systems yield position and velocity data at a much faster rate than conventional theodolite systems. Since the limitations of data obtained with radar and phototheodolites are not well known to the meteorologist, this study was undertaken to investigate some of these problems from a meteorologist's viewpoint. Several fundamental problems were investigated. Some are due to the geometry of the trackers relative to the balloon and others to the mathematics of processing the basic data. It was found, for instance, that estimates of the position components (x,y,z) are affected by the mathematics of transforming from the basic observations range, azimuth and elevations. It was also found that there are advantages to using the range, azimuth and elevation (R,A,E) coordinate system in performing a dynamic evaluation of the tracking system. Finally, care must be exercised in performing a dynamic evaluation or a strong possibility of underrating the system can result due to geometry alone. (Author)
AD-656 738 HC$3.00 MF$0.65

A DIABATIC SURFACE BOUNDARY LAYER MODEL.
Atmospheric Sciences Lab White Sands Missile Range N Mex
For primary bibliographic entry see Field 4B.
AD-656 739 HC$3.00 MF$0.65

RESEARCH DIRECTED TOWARD THE OBSERVATION AND INTERPRETATION OF SOLAR PHENOMENA.
Harvard Coll Observatory Cambridge Mass Solar Dept
For primary bibliographic entry see Field 3B.
AD-656 751 HC$3.00 MF$0.65

SOLAR RADIATION AND ATMOSPHERIC ABSORPTION IN THE MM WAVE REGION.
Semiannual rept. 1 May-31 Oct 66,
California Univ Berkeley Space Sciences Lab
Samuel Silver. 31 Oct 66, 4p Rept no. Series-7-Issue-51
Contract Nonr-222 (54), Grant NsG-243

Descriptors: (*Solar radiation, *Atmosphere), (*Millimeter waves, Absorption), Blackbody radiation, Sky brightness, Ozone, Antennas, Liquefied gases, Nitrogen, Crystal detectors, Meteorological parameters, Radiometers, Planets, Water vapor.

Progress during the reporting period is noted in the following areas: Detection of both emission and absorption spectra by atmospheric ozone; Installation of the radiometer on the infrared trailer, and transporting of it to the Barcroft Laboratory in the White Mountains (cosmic background radiation measurements at 1.5 cm); and, emission spectrum measurements of the planet Venus.
AD-656 754 HC$3.00 MF$0.65

IONOSPHERIC PERTURBATIONS AND SCHUMANN RESONANCE DATA.
Doctoral thesis,
Massachusetts Inst of Tech Cambridge Geophysics Lab
Philip H. Nelson. May 67, 123p
Contract Nonr-1841 (75)

Descriptors: (*Ionospheric disturbances, Electromagnetic waves), Theses, Magnetic storms, Diurnal variations, Thunderstorms, Lightning, Electron density, Atmosphere models, Tracking, Resonance.
Identifiers: Schumann resonance.

The properties of the first Schumann resonance mode are examined experimentally and theoretically to determine the influence of ionospheric disturbance events upon the electromagnetic earth-ionosphere cavity. On the experimental side, a phase-sensitive tracking system has been constructed to monitor the first mode peak frequency and Q on a continual basis. The tracking system monitored signals from a vertical antenna in eastern Massachusetts for five months during 1966-1967. On the theoretical side, a study of the inverse problem was made. The results show that the short term resonance variations can be used to locate ionospheric perturbations. The transmission surface representation of the earth-ionosphere cavity is solved using a Green's function technique to obtain the cavity response to perturbed ionospheric models. An iterative procedure solves the matrix problem which relates frequency changes to changes in ionospheric parameters, showing the geographic distribution of ionospheric perturbations. (Author)
AD-656 761 HC$3.00 MF$0.65

DISTRIBUTIONS AND LIFETIMES OF N AND NO BETWEEN 100 AND 200 KM.
Michigan Univ., Ann Arbor. High Altitude Engineering Lab.
S. N. Ghosh. Mar 67, 30p NASA-CR-86618, REPT.-05627-8-S
Contract NASR-54/05/

Descriptors: *Lifetime, *Nitric oxide, *Nitrogen atom, *Upper atmosphere, Atmosphere, Atom, Coefficient, Density, Distribution, Electron, High altitude, Ion, Loss, Mass, Molecule, Neutral, Nitric, Nitrogen, Oxide, Particle, Rate, Reaction, Spectrometry, Temperature, Upper.

For abstract, see STAR 05 18.
N67-31506 HC$3.00 MF$0.65

COSMIC DUST IN THE STRATOSPHERE.
California Univ., San Diego.
J. R. Arnold, N. Bhandari, and D. W. Parkin. 1967, 30p NASA-CR-86624
Grant NSG-321

Descriptors: *Balloon flight, *Cosmic dust, *Sampling device, *Stratosphere, Balloon, Collector, Cosmic, Device, Dust, Extraterrestrial, Flight, Impactor, Micron, Particle, Sampling, Screen, Size, Tube.

For abstract, see STAR 05 18.
N67-31811 HC$3.00 MF$0.65

STUDY OF THE EARTH'S MAGNETIC FIELD WITH THE AID OF RADIATION BELTS.
Volt Technical Corp., Washington, D. C.
For primary bibliographic entry see Field 8N.
For abstract, see STAR 05 18.
N67-31839 HC$3.00 MF$0.65

ERROR ANALYSIS OF INVERSION TECHNIQUES FINAL REPORT.
Gca Technology Div., Gca Corp., Bedford, Mass.
E. T. Florance. Jun 67, 50p NASA-CR-86626, GCA-TR-67-8-N
Contract NAS5-3352

Descriptors: *Atmospheric temperature, *Error, *Inversion, *Satellite measurement, *Temperature profile, Algorithm, Atmospheric, Computer, Function, Measurement, Method, Profile, Program, Radiance, Radiometer, Ramp, Satellite, Spectral, Temperature, Window.

For abstract, see STAR 05 18.
N67-31993 HC$3.00 MF$0.65

ON THE ENERGY FLUXES OF LOW-ENERGY PROTONS AND POSITIVE IONS IN THE EARTH'S INNER RADIATION ZONES.
State Univ. of Iowa, Iowa City. Dept. of Physics and Astronomy.
L. A. Frank, and R. L. Swisher. Jun 67, 12p
NASA-CR-86919, U. OF IOWA-67-33
Grant NSG-233-62, Contract NONR-1509/06/

Descriptors: *Inner radiation belt, *Ion, *Proton energy, Belt, Charge, Earth, Energy, Flux, Inner, Low energy, Magnetosphere, Positive, Proton, Radiation, Zone.

For abstract, see STAR 05 18.
N67-32179 HC$3.00 MF$0.65

SUPERPRESSURE BALLOONS FOR HORIZONTAL SOUNDINGS OF THE ATMOSPHERE.
Technical note,
National Center for Atmospheric Research, Boulder, Colo.
Vincent E. Lally. Jun 67, 175p NCAR-TN-28

Descriptors: (*Atmospheric sounding, *Balloons), Leakage (Fluid), Stability, Ice, Stresses, Life expectancy, Solar radiation, Temperature, Diurnal variations, Oscillation, Sensors, Failure (Mechanics), Position finding.
Identifiers: GHOST project.

Contents: The superpressure balloon -- how it flies; Balloon shapes and stresses; Free lift and supertemperature stresses; Balloon life; The radiation environment; Balloon stability; Sensors for use on superpressure flights; Modes of balloon failure; Balloon testing techniques; Balloon materials; Location techniques.
PB-175 658 HC$3.00 MF$0.65

PATH INTERMODULATION DISTORTION MEASUREMENTS OF NOISE-POWER-RATIO OVER TROPOSPHERIC BEYOND-THE-HORIZON PATHS EMPLOYING AN FDM-FM SYSTEM,
Institute for Telecommunications Sciences and Aeronomy, Boulder, Colo.
For primary bibliographic entry see Field 17B.
PB-175 680 HC$3.00 MF$0.65

4B. Meteorology

WORLD-WIDE AIRFIELD SUMMARIES, VOLUME I.
Environmental Technical Applications Center (Air Force) Washington D C
Jun 67, 491p

Descriptors: (*Climatology, Airports), Weather, Weather stations, Temperature, Wind, Atmospheric precipitation, Humidity, Snow, Periodic variations, Velocity, Visibility, Tables, Southeast Asia, Meteorological parameters.

The volume is the first of a series of compilations which is world-wide in scope. It consists of climatological summaries for selected airfields and for the climatic areas in which they are located. When complete, the series will include data for approximately 3000 stations. The summaries were prepared by the U. S. Air Force, Air Weather Service, and were provided in the form of magnetic tape. These are being compiled in book form, by country or geographical area, for promulgation to Naval Weather Service units. (Author)
AD-656 092 HC$3.00 MF$0.65

A CONSTANT TEMPERATURE HOT-WIRE ANEMOMETER.
Revised ed.,
Pennsylvania State Univ University Park
J. C. Wyngaard, and J. L. Lumley. 19 Dec 66, 3p
Contract NOw-65-0123
Revision of manuscript submitted 19 Aug 66.
Availability: Published in J. Sci. Instrum v44 p363-5 1967.

Descriptors: (*Anemometers, Circuits), Amplifiers, Design, Frequency, Performance (Engineering), Temperature.

A compact, inexpensive, constant temperature hot-wire anemometer circuit using solid state operational amplifiers is described. A theoretical expression for frequency response and an experimental check are given. Theoretical and experimental response data for an existing unit are shown. (Author)
AD-656 148 Not available from CFSTI.

A STATISTICAL MODEL OF THE TEMPERATURE FIELD AT SUPERSONIC AIRCRAFT ALTITUDES.
Air Force Surveys in Geophysics No. 193,
Air Force Cambridge Research Labs L G Hanscom Field Mass
Irving I. Gringorten. May 67, 53p Rept no. ARCRL-67-0274

Descriptors: (*Atmospheric temperature, *Flight paths), (*Supersonic planes, Flight paths), Transport planes, High altitude, Mathematical models.
Identifiers: Supersonic transport aircraft.

Data archives are such that, for a selected cruising level, a reasonably large sample of daily average temperatures along a specific route can be obtained and summarized into a frequency distribution. But if, as in Air Force operations, many different and constantly changing routes are involved, then the climatologic tools and methods must be such as to provide estimates of the route average temperature without recourse to the archives and the processing of raw data. A method was devised that utilizes a model of the horizontal spatial correlations of temperature. It was demonstrated on a continent-wide area, and shows promise of hemisphere-wide application. (Author)
AD-656 309 HC$3.00 MF$0.65

DISTRIBUTIONS OF RADAR ECHOES OVER THE UNITED STATES.
Air Force Cambridge Research Labs L G Hanscom Field Mass
For primary bibliographic entry see Field 17I.
AD-656 310 HC$3.00 MF$0.65

THE ENERGY SPECTRUM OF THE Z > OR-20 COMPONENT OF THE COSMIC RADIATION.
Minnesota Univ Minneapolis Cosmic Ray Group
For primary bibliographic entry see Field 4A.
AD-656 432 HC$3.00 MF$0.65

THE CHARGE DISTRIBUTION OF THE ENERGETIC VERY HEAVY NUCLEI IN THE PRIMARY COSMIC RADIATION.
Minnesota Univ Minneapolis Cosmic Ray Group
For primary bibliographic entry see Field 4A.
AD-656 433 HC$3.00 MF$0.65

INTRODUCTION NORTHERN HEMISPHERE I.
Cold Regions Science and Engineering Part I: Environment; Section A: General,
Cold Regions Research and Engineering Lab Hanover N H
C. Wilson. Jun 67, 151p Rept no. Science/Engineering-1-A3a

Descriptors: (*Climatology, *Northern Hemisphere), Cold weather tests, Arctic regions, Ice, Snow, Environmental tests, Pressure, Weather, Meteorological parameters, Solar radiation, Maps, Heat, Periodic variations.

A review summary of the climatological environment of the Northern Hemisphere contains a general introduction to the cold regions and a discussion of geographic controls and meteorological aspects including: the hemisphere surface in terms of configuration and relief, vegetation zones and permanent and seasonal ice and snow; the general circulation and weather system dealing with the circumpolar vortex, sea-level pressure and cyclonic frequency, circulation system persistence, and surface weather associated with high latitude pressures; the net radiation and heat balance. Selected bibliographic references are given. (Author)
AD-656 447 HC$3.00 MF$0.65

RADIOACTIVE FALLOUT IN NORTHERN REGIONS.
Cold Regions Research and Engineering Lab Hanover N H
For primary bibliographic entry see Field 18H.
AD-656 448 HC$3.00 MF$0.65

SYSTEM DESIGN FOR THE ATMOSPHERIC SCIENCES OFFICE WIND RESEARCH FACILITY,
Atmospheric Sciences Lab White Sands Missile Range N Mex
J. D. Horn, and J. A. Hunt. May 67, 51p
ECOM-5127

Descriptors: (*Meteorological parameters, Measurement), (*Wind tunnels, Design), Turbulence, Laminar flow, Wind, Instrumentation, Velocity, Scale, Thermocouples, Vibration, Sensors, Diagrams.

System design outlines are presented for measurement of aerodynamic parameters in a wind tunnel. Pressure measurements are obtained by an electromanometer system with readout for twelve sensing stations. Velocity is determined by pitot tube and hot wire devices. Models may be mounted in three modes on a sting and sector system for experimental runs. Vibration sensors and dynamic response simulation are available. Temperature gradients are determined by a nine-element thermocouple array. Provisions are made for a digital data acquisition system and visual analog display. (Author)
AD-656 464 HC$3.00 MF$0.65

STUDIES OF DENSITY CHANGES THROUGH FRONTAL SYSTEMS.
Technical rept.,
Army Electronics Command Fort Monmouth N J
Marvin J. Lowenthal. May 67, 25p Rept no. ECOM-2828

Descriptors: (*Air mass analysis, Density), (*Projectile trajectories, Meteorological phenomena), United states, Western Europe, Thunderstorms, Storms, Meteorological parameters, Ranges (Distance), Errors, Accuracy, Ballistics.

Frontal systems in the United States and Western Europe were examined in detail to determine the variation in density across the fronts. The significance of these changes was considered, taking into account the accuracies of measurement and weapons. Using zone density as a criterion, it was found that warm fronts are not at all significant ballistically; and most cold fronts only marginally. In contrast, a squall line or thunderstorm is accompanied by large, short-lived density variations that could, if ignored, lead to excessive range errors in artillery firings. (Author)
AD-656 602 HC$3.00 MF$0.65

BOUNDARY-LAYER METEOROLOGY AS DERIVED FROM REDUCTION OF THE FRIGORIMETER DATA. PART II. POLAR ZONES.
Technical rept.,
Army Electronics Command Fort Monmouth N J
E. C. Taylor-Ellis. Apr 67, 34p Rept no. ECOM-2825-Pt-2

Descriptors: (*Meteorology, *Arctic regions), Climatology, Boundary layer, Wind, Meteorological instruments, Periodic variations, Atmospheric precipitation, Efficiency, Measurement, Meteorological parameters.

The report reviews 84 months of Frigorimeter data measured in Arctic and Antarctic environments. The rationale underlying the development of the black-body sensor of the Frigorimeter is summarized, and the climatology of eight polar sites is illustrated. Conclusions are drawn which attest the ruggedness and the pragmatic usefulness of the Frigorimeter as a meteorological tool. (Author)
AD-656 604 HC$3.00 MF$0.65

ON TIME VARIABILITY OF WIND AT WHITE SANDS MISSILE RANGE, NEW MEXICO,
Atmospheric Sciences Lab White Sands Missile Range N Mex
L. J. Rider. Jun 67, 24p
ECOM-5130

Descriptors: (*Meteorological balloons, *Wind), Balloons, Flight paths, Velocity, Weather forecasting, Periodic variations, New Mexico.

Records of cinetheodolite balloon observations at White Sands Missile Range, New Mexico (WSMR) to 8000 feet above the surface have been analyzed in sets of 11- and 20-minute intervals to determine the magnitude of horizontal wind vector changes. The means of the magnitude for the horizontal wind vector changes varied from 1.8 to 2.8 ft/sec for time intervals of 11 and 20 minutes. The means of the horizontal wind direction change over the same time intervals varied from 7 to 34 degrees. The greatest variability occurred in layers below 3000 feet. (Author)
AD-656 605 HC$3.00 MF$0.65

PROCEEDINGS, FOURTH AFCRL SCIENTIFIC BALLOON SYMPOSIUM.
Air Force Cambridge Research Labs L G Hanscom Field Mass
For primary bibliographic entry see Field 1C.
AD-656 692 HC$3.00 MF$0.65

SOVIET AUTOMATIC HYDROMETEOROLOGICAL NETWORK.
ATD work assignment no. N-67-4.
Library of Congress Washington D C Aerospace Technology Div
21 Aug 67, 69p Rept no. ATD-67-29
TT-67-62550
Rept. on Surveys of Foreign Scientific and Technical Literature.

Descriptors: (*Weather stations, *Telemeter systems), (*Data processing systems, Meteorological parameters), USSR, Automation, Meteorological satellites, Wind-direction indicators, Cloud height indicators, Computers, Facsimile communication systems, Weather forecasting, Meteorological instruments, Atmospheric temperature, Cloud cover.

The present compilation of abstracts is divided into three parts: Part I outlines various concepts and stages in the development of the fully automated weather-data collection and handling networks for the USSR Hydrometeorological Service; Part II deals primarily with facsimile transmission and reception equipment presently used by the Soviet Hydrometeorological Service; and, Part III covers computer input, processing, and output of meteorological information. Generally speaking, it is felt by the analyst that the material contained in this report represents only an initial glimpse into the operation and components of what will eventually be a fully automatic weather network.
AD-656 702 HC$3.00 MF$0.65

A DIABATIC SURFACE BOUNDARY LAYER MODEL.
Data rept.,
Atmospheric Sciences Lab White Sands Missile Range N Mex
Frank V. Hansen. Jul 67, 171p
ECOM-5138

Descriptors: (*Atmosphere models, Boundary layer), Tables, Wind, Numerical methods and procedures, Atmospheric temperature, Atmospheric motion, Micrometeorology.

A diabatic surface boundary layer model valid for stationary, homogeneous conditions in stable and unstable air is developed from dynamic similarity of flows concept as applied to the lower portion of the atmosphere. The model is a development of the basic similarity theory of Monin and Obukhov and utilizes concepts advocated by McVehil, Panofsky and Pandolfo. It was found that a critical value of the gradient Richardson number exists at Ri = 0.223 and that the vertical gradients of wind and temperature are inversely proportional to height, to a negative power of the exchange coefficient ratio. The model is presented in tabular form over the stability range 0.220 > Ri > -5.00. (Author)
AD-656 739 HC$3.00 MF$0.65

SOLAR RADIATION AND ATMOSPHERIC ABSORPTION IN THE MM WAVE REGION.
California Univ Berkeley Space Sciences Lab
For primary bibliographic entry see Field 4A.
AD-656 754 HC$3.00 MF$0.65

RADIOLOGICAL PHYSICS DIVISION ANNUAL REPORT, JULY 1965 TO JUNE 1966,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 7E.
For abstract, see NSA 21 15.
ANL-7220 HC$3.00 MF$0.65

OSCILLATORY AND TRANSITORY EKMAN BOUNDARY LAYERS.
Maryland Univ., College Park. Inst. for Fluid Dynamics and Applied Mathematics.
A. J. Faller, and R. Kaylor. Jul 66, 30p NASA-CR-86603, BN-461
Grant NSG-398, Contract NSF GP-3443

Descriptors: *Boundary layer flow, *Ekman layer, *Numerical analysis, *Wind pressure, Analysis, Boundary, Constant, Equation, Flow, Function, Layer, Motion, Numerical, Ocean, Oscillation, Pressure, Solution, Spiral, Step, Stress, Transition, Variation, Velocity, Viscosity, Wind.

For abstract, see STAR 05 18.
N67-31520 HC$3.00 MF$0.65

SOVIET ANTARCTIC EXPEDITIONS, 1959 - 1961.
Israel Program for Scientific Translations, Ltd., Jerusalem.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 05 18.
N67-32168 HC$3.00 MF$0.65

SOVIET ANTARCTIC EXPEDITIONS, 1955 - 1959.
Israel Program for Scientific Translations, Ltd., Jerusalem.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 05 18.
N67-32170 HC$3.00 MF$0.65

INVESTIGATION OF WARM FOG PROPERTIES AND FOG MODIFICATION CONCEPTS QUARTERLY PROGRESS REPORT.
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
J. E. Jiusto, and W. C. Kocmond. 15 Jul 67, 24p
NASA-CR-86666, CAL-RM-1788-P-16
Contract NASR-156

Descriptors: *Fog, *Seeding, *Sodium chloride, Aircraf., Chloride, Dissipation, Distribution, Drop, Laboratory, Landing, Property, Size, Sodium, Visibility, Warm.

For abstract, see STAR 05 18.
N67-32510 HC$3.00 MF$0.65

A SNOW INDEX.
Technical memorandum,
National Meteorological Center, Suitland, Md.
R. J. Younkin. Jun 67, 12p WBTM-NMC-40

Descriptors: (*Snow, *Weather forecasting), Troposphere, Atmospheric temperature, Rain, Meteorological parameters, Atmospheric precipitation, Atmosphere models.

The report gives a snow index useful for short-range forecasting of snowfall, as opposed to rainfall. The model may also be useful to assess lower tropospheric thermal structure during important snowfall periods.
PB-175 641 HC$3.00 MF$0.65

SUPERPRESSURE BALLOONS FOR HORIZONTAL SOUNDINGS OF THE ATMOSPHERE.
National Center for Atmospheric Research, Boulder, Colo.
For primary bibliographic entry see Field 4A.
PB-175 658 HC$3.00 MF$0.65

5. BEHAVIORAL AND SOCIAL SCIENCES

5A. Administration and Management

ESTIMATING FROM MISCLASSIFIED DATA,
Rand Corp Santa Monica Calif
S. J. Press. Jul 67, 35p Rept no. RM-5360-ISA
Contracts DAHC15-67-C-0158, DAHC15-67-C-0143

Descriptors: (*Management engineering, *Decision making), (*Statistical analysis, *Operations research), Problem solving, Classification, Group dynamics, Theory, Probability, Reaction (Psychology).

A statistical method for estimating the proportions of items in each of several categories, based on an item-by-item classification in which many items may be misclassified. A specific case of interest is that in which the items are subjects being interviewed and the subjects may be hostile. Maximum likelihood estimators are developed for both the two-category and the multicategory response cases with respect to a group of noncooperative interviewees. An assessment is made, for each subject, of the probability that he is hostile. These probabilities are then combined with the actual responses to obtain the maximum likelihood estimators. Explicit evaluation of the estimators for a sample of n subjects and r categories requires solution of a simple concave programming problem involving a logarithmic objective function in variables confined to the unit interval. A Bayesian approach is used to evaluate the misclassification (or hostility) probabilities. It is assumed that the analysis applies to a single question only. For a survey containing many questions the estimators would be evaluated separately for each question. The analysis can also be generalized to consider many questions simultaneously.
AD-655 845 HC$3.00 MF$0.65

ADMINISTRATIVE TRAINING AND RESEARCH USING SMALL GROUP EXERCISES. I. COMBINING MANAGEMENT TRAINING AND RESEARCH. II,
Pittsburgh Univ Pa Management Research Center
For primary bibliographic entry see Field 5I.
AD-655 992 Not available from CFSTI.

LINEAR DISCRETE OPTIMAL SYSTEMS WITH SIDE CONSTRAINTS,
South Carolina Univ Columbia Dept of Electrical Engineering
Dong Hak Chyung. 1967, 8p
AFOSR-67-1777
Grant AF-AFOSR-571-66
Availability: Published in Proceedings Ann Princeton Conference Inform. Sci Sys n1 p35-40 1967.

Descriptors: (*Optimization, *Control), (*Operations research, Linear systems), Scientific research, Costs, Functions, Problem solving, Set theory, Sequences, Theorems.

Linear discrete systems with convex cost functionals and convex side constraints are investigated. Necessary and sufficient conditions for an optimal control are obtained and the existence of an optimal control is proved.
AD-656 022 Not available from CFSTI.

OPTIMAL MAINTENANCE POLICY AND SALE DATE OF A MACHINE.
Research rept.,
Carnegie Inst of Tech Pittsburgh Pa Management Sciences Research Group
Gerald L. Thompson. Jul 67, 16p Rept no. RR-104
Contract Nonr-760 (24)

Descriptors: (*Maintenance, *Optimization), (*Management control systems, Machines), Mathematical models, Disposal, Theory.

A machine is to be bought, used for productive purposes for a length of time, and then sold. It is possible to do preventive maintenance while the machine is being used, if desired, in order to slow down the degradation of the machine's capability. The value of owning the machine is the sum of the discounted value of the machine when sold. In this paper a modification of a model due to B. Naslund for the problem is discussed. Using Pontryagin's maximum principle, the problem is treated as one of optimal control with the control variables being the use or nonuse of preventive maintenance and the selection of the sale date. It is shown that the optimal maintenance policy is bang-bang, and methods for finding the optimal sale date are determined. Simple examples show the various kinds

of solutions that can be obtained with varying assumptions concerning the actual functions used in the model. (Author)
AD-656 029 HC$3.00 MF$0.65

THE DELIVERY PROBLEM.
Carnegie Inst of Tech Pittsburgh Pa Management Sciences Research Group
For primary bibliographic entry see Field 12B.
AD-656 030 HC$3.00 MF$0.65

PERSONNEL IMPLICATIONS OF NEW TECHNOLOGICAL DEVELOPMENTS, MICROELECTRONICS AND AUTOMATION.
Naval Personnel Research Activity San Diego Calif
For primary bibliographic entry see Field 9C.
AD-656 452 HC$3.00 MF$0.65

TECHNOLOGICAL PROJECTION AND ADVANCED PRODUCT PLANNING,
Rand Corp Santa Monica Calif
Frederick S. Pardee. Jul 67, 31p Rept no. P-3622
Presented at the Annual Technology and Management Conference (1st) at Lake Placid, N. Y., 22-25 May 67.

Descriptors: (*Industrial production, *Management planning), Decision making, Predictions, Weapon systems, Commerce, Uncertainty, Economics.

The methodology suggested in this paper includes several extensions to basic technological projection techniques, identification of context in the analysis of the transition from technical feasibility to commercial profitability, and refinements in capital investment methodology. If a comprehensive methodology incorporating those various features can be developed and implemented, then perhaps it will be with less hesitancy that one might venture to suggest the use of summary projections directly relating growth in technical attributes with percent return on investment. (Author)
AD-656 695 HC$3.00 MF$0.65

PRICE STRATEGY OLIGOPOLY WITH PRODUCT VARIATION,
Yale Univ New Haven Conn Cowles Foundation for Research in Economics
For primary bibliographic entry see Field 12B.
AD-656 721 HC$3.00 MF$0.65

EARLY HISTORY OF ASSOCIATED UNIVERSITIES AND BROOKHAVEN NATIONAL LABORATORY,
Brookhaven National Lab., Upton, N. Y.
Norman F. Ramsey. 30 Mar 66, 20p
Contract AT (30-2)-GEN-16

Descriptors: (*Nuclear physics laboratories, *Universities), History, Nuclear physics, Nuclear engineering.

For abstract, see NSA 21 15.
BNL-992 HC$3.00 MF$0.65

BROOKHAVEN NATIONAL LABORATORY ANNUAL REPORT JULY 1, 1966.
Associated Universities, Inc., New York.
For primary bibliographic entry see Field 18I.
BNL-994 (AS-20) HC$3.00 MF$0.65

PROCEEDINGS OF THE 1966 STANDARDS LABORATORY CONFERENCE HELD MAY 9-12, 1966, NATIONAL BUREAU OF STANDARDS, GAITHERSBURG FACILITY, WASHINGTON, D. C.
National Bureau of Standards, Washington, D. C.
For primary bibliographic entry see Field 14B.
NBS-MP-291 HC$1.00 MF$0.65

THE MEASUREMENT AND IMPROVEMENT OF R+D MARKETING EFFECTIVENESS.
Massachusetts Inst. of Tech., Cambridge. Alfred P. Sloan School of Management.
E. B. Roberts. Jan 67, 18p NASA-CR-85971, REPT.-235-66
Grant NSG-235
Presented At the 5th Ann. Management Conf. on Marketing in the Defense Ind., Boston, 19 May 1966, Sponsored By Defense Marketing Group, Am. Marketing Assoc., and Bur. of Business Res.

Descriptors: *Contractor, *Economics, *Management planning, *Research project, Analysis, Development, Effectiveness, Government, Industry, Management, Market, Planning, Project, Research.

For abstract, see STAR 05 18.
N67-31553 HC$3.00 MF$0.65

AN OPTIMIZATION PROCEDURE FOR NETWORK PLANNING SYSTEMS.
Texas A&m Univ., College Station. Graduate Coll. O. S. Madrigal. May 67, 102p NASA-CR-65644 Contract NAS9-4318

Descriptors: *Computer program, *Management planning, *Optimization, *Time factor, Algorithm, Compression, Computer, Control, Cost, Duration, Factor, Fortran, Function, Large, Management, Network, Path, Planning, Program, Project, Time.

For abstract, see STAR 05 18.
N67-32566 HC$3.00 MF$0.65

IMPACT OF HIGHWAY BEAUTIFICATION ACT ON OUTDOOR ADVERTISING FIRMS IN WASHINGTON STATE,
Washington Univ., Seattle. Graduate School of Business Administration.
For primary bibliographic entry see Field 5C.
PB-175 651 HC$3.00 MF$0.65

5B. Documentation and Information Technology

ON TECTONIC TERMINOLOGY,
Directorate of Scientific Information Services Ottawa (Ontario)
For primary bibliographic entry see Field 8G.
AD-655 900 HC$3.00 MF$0.65

COMPUTER-ASSISTED EXPLANATION: A GUIDE TO EXPLAINING: AND SOME WAYS OF USING A COMPUTER TO ASSIST IN CLEAR EXPLANATION,
Information International Inc Cambridge Mass
For primary bibliographic entry see Field 5G.
AD-655 915 Not available from CFSTI.

TECHNIQUE FOR THE AUTOMATIC GENERATION OF BIBLIOGRAPHIES (A BIOMEDICAL INFORMATION APPLICATION),
General Dynamics/Convair San Diego Calif
For primary bibliographic entry see Field 6E.
AD-655 925 HC$3.00 MF$0.65

R AND D ABSTRACTS. VOLUME 20 NUMBER 10, 16-31 MAY 1967.
Ministry of Technology London (England) Technical Information and Library Services
1967, 89p

Descriptors: (*Abstracts, Processing), (*Documentation, *Scientific research), Reports, Catalogs, Classification, Subject indexing, Materials, Production, Industrial equipment.

ABSTRACTS OF RESEARCH AND DEVELOPMENT DOCUMENTS are issued twice a month by Technical Information and Library Services, Ministry of Technology. It is intended primarily to serve Ministry of Technology branches and their contracters by abstracting, as promptly as possible classified and unclassified reports which are received from the Ministry, other government agencies, industry and universities.
AD-656 142 HC$3.00 MF$0.65

EFFECTIVENESS OF INFORMATION RETRIEVAL METHODS,
Bolt Beranek and Newman Inc Cambridge Mass
John A. Swets. 15 Jun 67, 52p Rept no. Scientific-8, BBN-1499
AFCRL-67-0412
Contract AF 19 (628)-5065, ARPA Order-627-2

Descriptors: (*Information retrieval, Effectiveness), Decision theory, Analysis, State-of-the-art reviews, Statistical analysis, Mathematical models, Exponential functions, Indexes, Documentation.
Identifiers: Evaluation, On-line systems, Density functions.

Results of some fifty different retrieval methods applied in three experimental retrieval systems were subjected to the analysis suggested by statistical decision theory. The analysis validates a previously-proposed measure of effectiveness and demonstrates its several desirable properties. The examination of a wide range of data in relation to this one metric provides a clear and general assessment of the current state of the retrieval art, and shows that the art is still far from what might be considered a desirable state. (Author)
AD-656 340 HC$3.00 MF$0.65

MECHANIZED BIBLIOGRAPHY OF DOCUMENTATION AND INFORMATION SCIENCES, SUPPLEMENT NO. 1,
Department of the Interior Washington D C Library
H. Holzbauer. Aug 67, 47p
See also AD-648 995.

Descriptors: (*Documentation, Bibliographies), Indexes, Subject indexing, Information retrieval, Periodicals, Technical information centers, Libraries.
Identifiers: Information sciences.

The bibliography consists of an author or corporate entry listing, a personal author index, a corporate author index, and a subject index.
AD-656 550 HC$3.00 MF$0.65

SELECTED OFFICIAL PUBLICATIONS, PROFESSIONAL PAPERS, AND PATENTS, 1966 EDITION.
Naval Ordnance Test Station China Lake Calif
Jun 67, 75p Rept no. NOTS-TP-4329

Descriptors: (*Rocket research, *Research program administration), (*Armed forces research, *Documentation), (*Guided missiles, Reports), (*Propellants, *Patents), Naval research, Naval research laboratories, Scientific research, Military publications.

Selected abstracts covering research concerned with guided missiles, rockets, propellants and other subjects of interest to Naval Ordnance Test Station.
AD-656 582 HC$3.00 MF$0.65

THE OFFICE OF AEROSPACE RESEARCH SCIENTIFIC AND TECHNICAL INFORMATION PROGRAM,

Office of Aerospace Research Arlington Va
Currie S. Downie, Thomas T. Luginbyhl, Alexander G. Hoshovsky, and Carlton M. Smith. 15 Mar 67, 81p Rept no. OAR-67-0009

Descriptors: (*Documentation, Dissemination), (*Scientific research, *Information retrieval), Management planning, Selection, Reports, Air force research, Technical information centers.
Identifiers: Selective dissemination of information.

The document outlines the mission and organization of the Office of Aerospace Research (OAR), then describes how its principal product, scientific and technical information, is disseminated through its various publications. The magnitude of OAR's research in Information Sciences (approximately 15% of total Federal expenditures in this area) is compared to that of other governmental agencies. Savings of over $3.5 million, resulting from an effective technical information program, are documented by examples. The role of the Office of Scientific and Technical Information within OAR as performed by the 16 personnel assigned is described in terms of its four divisions: Publications, Information Studies, Programs, and Executive. It is suggested that the most pressing problem facing the DoD Technical Information Program is the absence of integrated, DoD-wide planning efforts with the active participation of the three services and various DoD agencies. Planning conferences are needed to improve the organization structure and co-ordinate the future activities of the program. The classical functions of management -- planning, organizing, etc. -- should be reviewed to determine whether they are being adequately emphasized and implemented throughout DoD in the Scientific and Technical Information Program. (Author)
AD-656 694 HC$3.00 MF$0.65

STYLE GUIDE FOR ARL TECHNICAL REPORTS.
Aerospace Research Labs Wright-Patterson AFB Ohio
Jan 66, 22p Rept no. ARL-66-0001

Descriptors: (*Reports, Military requirements), Documentation, Dissemination, Preparation, Printing, Photographs.

The purpose of the guide is to specify the requirements for the editorial organization, preparation, and publication of ARL technical reports. (Author)
AD-656 717 HC$3.00 MF$0.65

SALVAGE OF FIRE AND WATER DAMAGED RECORDS, SBA, MINNEAPOLIS, MINNESOTA.
Federal Fire Council Washington D C
Jun 67, 4p

Descriptors: (*Records, Salvage), Disasters, Fires, Floods, Drying, Documentation.

During December 1966, the Small Business Administration's Minneapolis Regional Office was severely damaged by fire. That fire and the subsequent records salvage operations are described in the hopes that the techniques used and lessons learned will be useful to others should the need arise.
AD-656 758 HC$3.00 MF$0.65

ELECTRONIC COMPUTER PROGRAM FOR FLOOD RECORD COMPILATION AND FREQUENCY PLOT.
Bureau of Public Roads, Washington, D. C. Office of Research and Development.
For primary bibliographic entry see Field 8H.
PB-175 511 HC$3.00 MF$0.65

EXPERIMENTAL STUDIES OF RELEVANCE JUDGMENTS: FINAL REPORT. VOLUME II. DESCRIPTION OF INDIVIDUAL STUDIES.
Technical memo.,
System Development Corp., Santa Monica, Calif.
C. A. Cuadra. 30 Jun 67, 131p TM-3520/002/00-Vol-2
Contract NSF-C-424
See also PB-175 518, Vol I and PB-175 567, Vol 3.

Descriptors: (*Information retrieval, Effectiveness), Documentation, Search theory, Efficiency, Experimental design, Systems engineering, Subject indexing, Decision making, Data processing systems, Man-machine systems.

The report is the second volume in a three-volume Final Report on a project to develop empirical information on human relevance assessment. This volume contains detailed descriptions of 15 studies. Each description is intended to give sufficient detail not only to provide an understanding of the study's purpose, procedures and results but also to permit its replication by other investigators. An integration and interpretation of the findings of these individual studies is provided in Volume I of the Final Report. (Author)
PB-175 517 HC$3.00 MF$0.65

EXPERIMENTAL STUDIES OF RELEVANCE JUDGMENTS: FINAL REPORT. VOLUME I. PROJECT SUMMARY.
Technical memo.,
System Development Corp., Santa Monica, Calif.
Carlos A. Cuadra, and Robert C. Katter. 30 Jun 67, 125p TM-3520/001/00-Vol-1
Contract NSF-C-424
See also PB-175 517, Vol 2 and PB-175 567, Vol 3.

Descriptors: (*Information retrieval, Effectiveness), Documentation, Search theory, Efficiency, Experimental design, Systems engineering, Subject indexing, Decision making, Data processing systems, Man-machine systems.

The report is the first volume in a three-volume Final Report on a project to develop empirical information on human relevance assessment. The project took place over a two-year period and involved fifteen individual studies. (These studies and the supporting materials are described in detail in Volume II PB-175 517, and Volume III PB-175 567, respectively.) It is suggested that relevance judgments can be and are influenced by the skills and attitudes of the particular judges used, the documents and document sets used, the particular information requirement statements, the instructions and setting in which the judgments take place, the concepts and definitions of relevance employed in the judgments, and the type of rating scale or other medium used to express the judgments. These findings cast serious doubt on the wisdom of treating relevance scores as stable criteria for system or subsystem evaluation in those instances where the sources of variation cited above have not been recognized and properly controlled. The report discusses the practical and research implications of these findings and makes recommendations for priority work on the interface between the user and the information system. (Author)
PB-175 518 HC$3.00 MF$0.65

EXTRACTING THE BASIC STRUCTURE OF SCIENTIFIC LITERATURE.
American Institutes for Research, Silver Spring, Md.
Harold P. Van Cott, and Albert Zavala. 1967, 59p Grant NSF-GN-496

Descriptors: (*Periodicals, Subject indexing), Selection, Libraries, Factor analysis, Abstracts, Physics, Data storage systems, Feasibility studies.

Much of the periodical literature within scientific disciplines is characterized by overlap in content among journals and by scatter of content areas across journals. This obscures the inherent structure that may exist within the literature of discipline, creating problems for authors seeking suitable publication outlets, for editors wishing to establish coverage policy, and for libraries wishing to be selective but representative in acquiring journals for a discipline. Four factor analytic studies were done on samples of the periodical literature of physics in an attempt to define its inherent structure. The first study resulted in ten factors interpreted as journal groups within physics. The remaining three studies resulted in factors that define relatively homogenous topical or content areas. The consistency of results across the analyses justified the conclusion that factor analysis methods are applicable to defining the structure of the literature of science. (Author)
PB-175 552 HC$3.00 MF$0.65

EXPERIMENTAL STUDIES OF RELEVANCE JUDGMENTS: FINAL REPORT. VOLUME III. COMPILATION OF FORMS, GUIDES, SCHEDULES, AND INSTRUCTIONS USED IN THE STUDIES.
Technical memorandum,
System Development Corp., Santa Monica, Calif.
Carlos A. Cuadra, Robert V. Katter, Emory H. Holmes, and Everett M. Wallace. 30 Jun 67, 200p TM-3520/003/00
Contract NSF-C-424
See also PB-175 518, Vol 1 and PB-175 517, Vol 2.

Descriptors: (*Information retrieval, Effectiveness), Documentation, Search theory, Efficiency, Experimental design, Systems engineering, Subject indexing, Decision making, Data processing systems, Man-machine systems.

The report is the third volume in a three-volume Final Report on a project to develop empirical information on human relevance assessment. The project, supported by the National Science Foundation and carried out by System Development Corporation, took place over a two-year period and involved fifteen individual studies. These appendices include all materials developed and used in the experiments and studies conducted during the course of the project. Materials for each experiment or study are presented in a separate appendix. (Author)
PB-175 567 HC$3.00 MF$0.65

THE PROCESS OF PROFESSIONAL INFORMATION EXCHANGE AMONG SCIENCE INFORMATION SPECIALISTS.
Final rept.,
Rowland and Co., Inc., Haddonfield, N. J.
George E. Rowland, Gary L. Hart, Lee W. Cozan, and Richard Faust. 1 Jun 67, 89p R/C-67-7
Contract NSF-C421

Descriptors: (*Documentation, Scientific personnel), (*Scientific personnel, Job analysis), Technical information centers, Libraries, Questionnaires, Data processing systems.
Identifiers: Information exchange systems, Information specialists.

A study was conducted to define the process of professional information exchange among science information specialists and to identify their requirements. An extensive nationwide field survey was made by interviewing 127 science information specialists who were located in 72 different qualified science information centers located from California to the East Coast. An effort was made to select from each organization one subject who was actively engaged in performing tasks necessary to provide science information to scientists, and one who administered or supervised the performance of those tasks. The respondents filled out

a questionnaire and were each interviewed for approximately 45 minutes to one hour. The data clearly indicate that the science information specialist is educationally and functionally different from the librarian; that the process of science information exchange among science information specialists is inadequate and needs considerable revision; and that government, industry, and academic institutions should all become involved in constructing a better communication system. Specific recommendations are given. (Author)
PB-175 568 HC$3.00 MF$0.65

CUMULATIVE INDEX TO TECHNICAL TRANSLATIONS, VOL. 13, JANUARY-JUNE 1965.
Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.
Jun 65, 242p
TT-67-62545
See also PB-175 723.

Descriptors: (*Periodicals, *Indexes), Scientific research, Documentation.
Identifiers: Technical translations.

Index entries provide the document announcement location in individual Technical Translations issues by supplying the issue number, field/group, and accession number for an author listing, a journal listing, and a report number listing.
PB-175 720 HC$3.00 MF$0.65

CUMULATIVE INDEX TO TECHNICAL TRANSLATIONS, VOL. 14, JULY-DECEMBER 1965.
Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.
Dec 65, 182p
TT-67-62546
See also PB-175 720.

Descriptors: (*Periodicals, *Indexes), Scientific research, Documentation.
Identifiers: Technical translations.

Index entries provide the document announcement location in individual Technical Translations issues by supplying the issue number, field/group, and accession number for an author listing, a journal listing, and a report number listing.
PB-175 721 HC$3.00 MF$0.65

CUMULATIVE INDEX TO TECHNICAL TRANSLATIONS VOL. 15, JANUARY-JUNE 1966.
Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.
Jun 66, 207p
TT-67-62547
See also PB-175 721, PB-175 723.

Descriptors: (*Periodicals, *Indexes), Scientific research, Documentation.
Identifiers: Technical translations.

Index entries provide the document announcement location in individual Technical Translations issues by supplying the issue number, field/group, and accession number for an author listing, a journal listing, and a report number listing.
PB-175 722 HC$3.00 MF$0.65

CUMULATIVE INDEX TO TECHNICAL TRANSLATIONS, VOL. 16, JULY-DECEMBER 1966.
Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.
Dec 66, 178p
TT-67-62548
See also PB-175 722.

Descriptors: (*Periodicals, *Indexes), Scientific research, Documentation.
Identifiers: Technical translations.

Index entries provide the document announcement location in individual Technical Translations issues by supplying the issue number, field/group, and accession number for an author listing, a journal listing, and a report number listing.
PB-175 723 HC$3.00 MF$0.65

5C. Economics

AN AUTOMATIC THREE-DIMENSIONAL MODELS MEASURING MACHINE IN R.A.E. WORKSHOPS.
Royal Aircraft Establishment Farnborough (England)
For primary bibliographic entry see Field 13I.
AD-656 140 HC$3.00 MF$0.65

GENERAL SOLUTION FOR THE ECONOMIC DESIGN OF X-CHARTS BASED ON DUNCAN'S MODEL.
Wisconsin Univ Madison Dept of Statistics
For primary bibliographic entry see Field 12B.
AD-656 596 HC$3.00 MF$0.65

TECHNOLOGICAL PROJECTION AND ADVANCED PRODUCT PLANNING,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5A.
AD-656 695 HC$3.00 MF$0.65

COMMON FUNDING IN NATO,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5D.
AD-656 700 HC$3.00 MF$0.65

PRICE STRATEGY OLIGOPOLY WITH PRODUCT VARIATION,
Yale Univ New Haven Conn Cowles Foundation for Research in Economics
For primary bibliographic entry see Field 12B.
AD-656 721 HC$3.00 MF$0.65

INDIVIDUAL CHARACTERISTICS SIGNIFICANT TO SALARY LEVELS OF ENGINEERS AND SCIENTISTS.
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 5I.
AD-805 809 HC$3.00 MF$0.65

EXPERIMENTS IN TECHNOLOGY UTILIZATION QUARTERLY REPORT, FEB. 1 - APR. 30, 1967.
Indiana Univ., Bloomington. Aerospace Research Applications Center.
30 Apr 67, 38p NASA-CR-85577
Contract NSR-15-003-055

Descriptors: *Information processing, *Management planning, *Technology, Aerospace, Development, Distribution, Facility, Implementation, Information, Literature, Management, Market, Planning, Processing, Program, Review.

For abstract, see STAR 05 18.
N67-31726 HC$3.00 MF$0.65

THE STUDY OF TRANSPORTATION REQUIREMENTS USING NATIONAL AND MULTIREGIONAL INPUT-OUTPUT TECHNIQUES,
Harvard Economic Research Project, Cambridge, Mass.
For primary bibliographic entry see Field 13F.
PB-174 742 HC$3.00 MF$0.65

THE SPRINGFIELD ARMORY PROJECT.
Realty Research and Consulting Corp., Pittsburgh, Pa.
Jul 67, 206p
Report on an Action-Oriented Program for Solving the Economic Problems Created by the Phase-Out of Major Military Installations. Prepared in cooperation with Economic Development Administration, Washington, D. C., and City of Springfield, Mass. The Armory Planning Committee.

Descriptors: (*Military facilities, Economics), (*Economics, Massachusetts), History, Museums, Education, Technicians, Commerce, Students, Costs, Buildings, Instructors, Budgets, Industries, Recreation.

The report is arranged in three major sections. The major sections include discussion of the proposed regional technical institute, the proposed expansion of the Springfield Armory Museum, and the industrial development program for the Springfield area, including a discussion of the Watershops Pond.
PB-174 944 HC$3.00 MF$0.65

A STUDY OF THE EASTERN INDUSTRIAL COAL MARKET.
Booz, Allen and Hamilton, Inc., Washington, D.C.
For primary bibliographic entry see Field 8G.
PB-175 601 HC$3.00 MF$0.65

THE ECONOMIC IMPACT OF INTERSTATE HIGHWAY 10 ON A RURAL AREA EAST OF HOUSTON, TEXAS.
Texas Transportation Inst., College Station.
For primary bibliographic entry see Field 13B.
PB-175 630 HC$3.00 MF$0.65

PERIPHERAL LAND STUDY: ECONOMICS, ESTHETICS, AND HIGHWAYS,
Washington Univ., Seattle. Dept. of Urban Planning.
For primary bibliographic entry see Field 13B.
PB-175 632 HC$3.00 MF$0.65

AVAILABILITY OF YELLOW BIRCH LOGS TO SOUTHERN PISCATAQUIS COUNTY, STATE OF MAINE, 1966.
Sewall (James W.) Co., Old Town, Maine.
For primary bibliographic entry see Field 2F.
PB-175 640 HC$3.00 MF$0.65

ARTS AND CRAFTS TECHNICAL ASSISTANCE DEMONSTRATION PROJECT.
West Virginia Dept. of Commerce, Charleston.
Jun 67, 60p
Contract Cc-6108
Prepared in cooperation with Economic Development Administration, Washington, D. C.

Descriptors: (*Economics, West Virginia), Commerce, Standards, Design, Finishes + finishing, Industrial production, Packaging, Employment, Training, Recreation.
Identifiers: Arts and crafts.

The objectives of this two-year Technical Assistance Project were to stimulate the economy and to provide income for West Virginia craftsmen through the marketing of quality West Virginia handicrafts. This group had been identified in part at the beginning of the project and were at that time seeking markets for their craft products. The primary concern was to help approximately 600 West Virginians upgrade the quality of their product so as to meet marketing standards. This was accomplished by two Craft Specialists and one Marketing Specialist giving technical assistance in design and finish, improving production techniques, economy of production, and packaging and marketing of the finished product.
PB-175 644 HC$3.00 MF$0.65

FACTORS INFLUENCING PATRONS TO STOP AT SELECTED TYPES OF MOTELS,
Washington Univ., Seattle. Graduate School of Business Administration.
Louis C. Wagner. Nov 66, 28p
Contract CPR-11-4211
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Commerce), (*Motor vehicle operators, Motivation), Buildings, Visual signals, Questionnaires, Factor analysis, Washington (State), Economics.
Identifiers: Motels, Advertising.

The study of the impact of the Highway Beautification Act on the Outdoor Advertising industry in Washington State was based on a sample of three firms operating in metropolitan areas and three firms in small cities. The July revision of the draft standards for sign controls in commercial and industrial areas was assumed for the analysis. Based on opinions of company officials the author found that expected losses of receipts for the three firms in the small cities were 45, 55, and 65 percent of total annual receipts. For the firms in metropolitan areas expected losses were 33, 42, and 45 percent of total annual receipts. Relative losses of painted bulletins were expected to be greater than poster panels. This is due primarily to the greater percentage of painted bulletins located on highways affected by the Act. (Author)
PB-175 648 HC$3.00 MF$0.65

HIGHWAY LOCATION AND DESIGN RESEARCH PROJECT.
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 13B.
PB-175 649 HC$3.00 MF$0.65

IMPACT OF HIGHWAY BEAUTIFICATION ACT ON OUTDOOR ADVERTISING FIRMS IN WASHINGTON STATE,
Washington Univ., Seattle. Graduate School of Business Administration.
Louis C. Wagner. Nov 66, 21p
Contract CPR-11-4211
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Markers), (*Commerce, Management planning), Washington (State), Rural areas, Urban areas, Economics.
Identifiers: Outdoor advertising, Highway Beautification Act.

This study of the impact of the Highway Beautification Act on the Outdoor Advertising industry in Washington State was based on a sample of three firms operating in metropolitan areas and three firms in small cities. The July revision of the draft standards for sign controls in commercial and industrial areas was assumed for the analysis. Based on opinions of company officials the author found that expected losses of receipts for the three firms in the small cities were 45, 55, and 65 percent of total annual receipts. For the firms in metropolitan areas expected losses were 33, 42, and 45 percent of total annual receipts. Relative losses of painted bulletins were expected to be greater than poster panels. This is due primarily to the greater percentage of painted bulletins located on highways affected by the Act. (Author)
PB-175 651 HC$3.00 MF$0.65

SEVERANCE DAMAGE STUDY, CASES 1-65,
Louisiana Polytechnic Inst., Ruston. Div. of Business and Economic Research.
W. R. Rives, E. Carl Jones, Dwayne L. Oglesby, W. Kenneth Lindhorst, and Burton R. Risinger.
Jan 67, 11p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, *Economics), Traffic, Commerce, Volume, Costs, Feasibility studies, Classification, Louisiana.

The report gives the findings from 65 case studies concerned with an analysis of the economic effect of a taking on the remaining land after part was taken for right of way along a controlled access Interstate highway or a four-lane free-access highway in Louisiana. The following broad conclusions have been drawn as a result of these case studies: Most properties within easy access of an Interstate interchange or located with frontage on a service road will increase in value because of the construction of the Interstate highway. There is a close relationship between the value of a remainder and its position in relation to an Interstate route. The amount of increase in the value of a property as a result of a taking is affected by the use of the property before the taking. The appraisers for the takings were fairly consistent in awarding severance damages in excess of the damages that were actually incurred. Commercial enterprises needing desirable locations along Interstate highways are now (1966) acquiring these sites immediately after the construction maps are available to the public. (Author)
PB-175 652 HC$3.00 MF$0.65

THE VALUE OF TIME FOR PASSENGER CARS: A THEORETICAL ANALYSIS AND DESCRIPTION OF PRELIMINARY EXPERIMENTS.
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 13G.
PB-175 653 HC$3.00 MF$0.65

FEASIBILITY OF COMPUTER STORAGE AND RETRIEVAL OF FREIGHT TARIFF INFORMATION, PHASE II.
Final rept.
Battelle Memorial Inst., Columbus, Ohio. Columbus Labs.
May 67, 323p
Contract C-132-66
See also PB-170 590 and PB-170 591.

Descriptors: (*Cargo, Costs), (*Data processing systems, Feasibility studies), Data storage systems, Information retrieval, Computers, Scheduling, Flow charting, Subroutines, Input-output devices, Time sharing, Display systems, Computer logic, Management planning.
Identifiers: Computer hardware.

The purpose of this research project has been to determine the feasibility of computer storage and retrieval of freight tariff information on file with the Interstate Commerce Commission. In Phase I, a computer logic was developed for the storage and retrieval of the following items of tariff information and their related rates: origin, commodity, destination, effective date, expiration date, status, mode, submode, conveyance, origin carrier, destination carrier, and rate category. The Phase I report has been published in two volumes (PB 170 590 and PB 170 591). This report covers the research done in Phase II of the project. In this phase the methods of Phase I were broadened to include tariff information pertaining to routing, accessorial charges, and footnotes, rules and regulations. The ways in which tariff information is used by shippers, carriers and related agencies are analyzed. Flow charts of computer logic are presented for the storage and retrieval of routing, accessorial charges (as exemplified by transit privileges and switching) and for five rules governing the calculation of freight charges. Cost guides based on a comparison of costs of different tariff-related functions as performed manually and as presently performed by computer are included. Data storage requirements and possible computer hardware configurations for different classes of users are developed. The basic conclusion of this report is that it is technically feasible to implement the computer logic developed here and in Phase I for a broad range of user conditions.
PB-175 706 HC$3.00 MF$0.65

5D. History, Law, and Political Science

REVIEW OF 'THE POLITICAL SYSTEM OF PAKISTAN',
Rand Corp Santa Monica Calif
Wayne Wilcox. Jul 67, 4p Rept no. P-3633
Availability: Published in Asian Student.

Descriptors: (*Pakistan, *Political science), History, Reviews.
Identifiers: Book reviews.

A review is presented of 'The Political System of Pakistan,' by Khalid Bin Sayeed, a book which surveys and integrates the broad range of historical, political, and economic data of Pakistan.
AD-656 305 Not available from CFSTI.

CINFAC BIBLIOGRAPHIC REVIEW: SUPPLEMENT NO. 13,
American Univ Washington D C Center for Research in Social Systems
For primary bibliographic entry see Field 15G.
AD-656 465 HC$3.00 MF$0.65

COMMON FUNDING IN NATO,
Rand Corp Santa Monica Calif
E. Vandevanter, Jr. Jun 67, 135p Rept no. RM-5282-PR
Contract F44620-67-C-0045

Descriptors: (*Military organizations, *Federal budgets), (*National defense, Organizations), United States Government, Government (Foreign), Armed forces budgets, France, Economics, Defense systems, Western Europe, Political science.
Identifiers: NATO.

An analysis is made of the NATO experience in common funding of infrastructure, operating accounts, and consortium activities. Guidelines for U.S. participation in future common funding activities in Europe are suggested. All three types of common funding have been of financial benefit to the United States. The United States spends more than twice as much on defense as all the other allies together; but under infrastructure, operating, and consortium accounts, U.S. expenditure averages less than half the amount contributed by other members. The United States has been the major beneficiary as a user of the common infrastructure facilities. Participation in future common-funding activities will be advantageous to the United States as long as U. S. strategic policy favors a strong local defense oriented toward 'flexible response' in Western Europe. The French position bears watching since common-funding projects appear to be one of the few forms of allied cooperation in which France will continue to participate on a limited basis. (Author)
AD-656 700 HC$3.00 MF$0.65

5E. Human Factors Engineering

PERFORMANCE IN AN AUDITORY VIGILANCE TASK WHILE SIMULTANEOUSLY TRACKING A VISUAL TARGET,
Douglas Aircraft Co Inc Long Beach Calif Aircraft Div
C. H. Baker, and A. Harabedian. Apr 62, 19p
Contract Nonr-1076 (00)
Prepared in cooperation with Human Factors Research, Inc., Long Beach, Calif., Technical rept. 740-2.

Descriptors: (*Tracking, Performance (Human)), (*Human engineering, Tracking), Visual signals, Auditory signals, Attention, Motor reactions.

Previous research has shown that under certain rather explicit conditions it is possible to facilitate performance on a vigilance task by performing another vigilance task simultaneously. The question arises as to whether or not performance on an auditory vigilance task is facilitated by simultaneously performing a continuous tracking task. It was concluded from this study that in such a situation performance on the vigilance task is not facilitated. On the other hand, simultaneous tracking did not significantly impair performance on the vigilance task. It is inferred that, in auditory monitoring situations where occasional signals must be detected and responded to, operator performance will not be impaired by the simultaneous performance of some task such as steering or piloting. (Author)
AD-656 437 HC$3.00 MF$0.65

HUMAN INFORMATION-PROCESSING CONCEPTS FOR SYSTEM ENGINEERS,
Michigan Univ Ann Arbor Dept of Psychology
For primary bibliographic entry see Field 5H.
AD-656 533 Not available from CFSTI.

RECENT PSYCHOLOGICAL RESEARCH RELEVANT TO THE HUMAN FACTORS ENGINEERING OF MAN-MACHINE SYSTEMS,
Michigan Univ Ann Arbor Dept of Psychology
For primary bibliographic entry see Field 5H.
AD-656 653 Not available from CFSTI.

ADVANCES IN THE USE OF COMPUTERS FOR HANDLING HUMAN FACTORS TASK DATA,
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
Lawrence E. Reed. Apr 67, 16p Rept no. AMRL-TR-67-16
Pub. in International Simulation and Training Conference (3rd), New York, 24-27 April 1967. Supported by NASA and Contract F33615-67-C-1036 with the System Development Corp.

Descriptors: (*Human engineering, *Data processing systems), (*Job analysis, Human engineering), Systems engineering, Training, Computers, Analysis, Data, Personnel management.

The purpose of the paper is to review some of the data problems the analyst must deal with in his work and to suggest some possible remedies. A review of the task analysis procedures is followed by a discussion of the uses of task analysis in system development programs. Problems connected with each were used to generate the goals of a research program, which is directed toward the development of computerized techniques to assist the analyst make better use of available data. (Author)
AD-656 701 HC$3.00 MF$0.65

HUMAN PERFORMANCE IN INFORMATION PROCESSING AND STORAGE.
Michigan Univ Ann Arbor Dept of Psychology
For primary bibliographic entry see Field 5J.
AD-656 709 HC$3.00 MF$0.65

THE USE OF A VISUAL TESTING APPARATUS FOR SPACE APPLICATION FINAL REPORT.
Serendipity Associates, Los Altos, Calif.
A. J. Hoisman, and A. Moots. Apr 67, 84p
NASA-CR-73099, TR-45-67-3
Contract NAS2-3725

Descriptors: *Calibration, *Flight test instrument, *Manned space flight, *Visual system, Acuity, Brightness, Flicker, Flight, Fusion, Instrument, Manned, Optimum, Parameter, Plan, Space flight, Support, System, Test, Tester, Visual.

For abstract, see STAR 05 18.
N67-32271 HC$3.00 MF$0.65

AIRCRAFT DESIGN-INDUCED PILOT ERROR.
Civil Aeronautics Board, Washington, D. C. Bureau of Safety.
For primary bibliographic entry see Field 1B.
PB-175 629 HC$3.00 MF$0.65

5G. Linguistics

ON TECTONIC TERMINOLOGY,
Directorate of Scientific Information Services Ottawa (Ontario)
For primary bibliographic entry see Field 8G.
AD-655 900 HC$3.00 MF$0.65

COMPUTER-ASSISTED EXPLANATION: A GUIDE TO EXPLAINING: AND SOME WAYS OF USING A COMPUTER TO ASSIST IN CLEAR EXPLANATION,
Information International Inc Cambridge Mass
Edmund C. Berkeley. May 67, 282p
Contract N00014-66-C-0281
Availability: Copyrighted monograph.

Descriptors: (*Vocabulary, Analysis), (*Computer programs, Vocabulary), Programmed instruction, Learning, Performance (Human), English language, Syntax.
Identifiers: Computer-assisted writing, Computer-assisted explanation, Computer-aided instruction, Explanation.

To explain is to make clear or plain, to change something not understood to something that is understood. This document defines explanation; makes clear the differences between explanation and related subjects; describes and illustrates over 50 factors affecting the quality of an explanation; discusses the classes of words in an explanation and gives a program for vocabulary analysis with a computer; explains methods for revising and improving an explanation and gives three illustrations at length; discusses practical aspects of improved explanation; states in full a powerful 'Vocabulary Analysis Program' which has been worked out and aids explaining (this program runs on the PDP-7 computer of Digital Equipment Corporation, and a copy of the program tape is available on request); states half a dozen more computer programs for aiding explanation; gives eight sample explanations and their assessment; gives an annotated bibliography of 18 references relating to better explanation; and contains a glossary and an index. (Author)
AD-655 915 Not available from CFSTI.

SYNTAX DIRECTED INTERPRETATION OF NATURAL LANGUAGE.
Doctoral thesis,
Carnegie Inst of Tech Pittsburgh Pa
L. Stephen Coles. 1967, 167p
AFOSR-67-1758
Contract SD-146

Descriptors: (*Language, Theses), (*Syntax, *Semantics), Computer programs, Programming languages, Programming (Computers), Display systems, Learning, English language, Computer logic, Problem solving.

The dissertation presents a method called syntax directed interpretation which permits the use of semantic information in a syntactic analysis of sentences taken from a restricted domain of natural language. This method is used in the resolution of syntactic ambiguity of English sentences with respect to a variable but well defined universe of discourse. The first chapter defines the problem and surveys previous work related to natural language and question-answering systems. In chapter two we describe an integrated approach to natural language processing which combines both syntax and semantics within the framework of a natural inference system. The logical properties of completeness and consistency are demonstrated for such systems. In chapter three a computer program (GRANIS) written in FORMULA ALGOL and using the method of syntax directed interpretation is described. A picture, which can be input directly via a graphic display console, serves as a context within which syntactic ambiguity of input sentences can be resolved. Chapter four considers various extensions of GRANIS in the direction of greater habitability, inferential power, knowledge acquisition, and adaptability. Chapter five concludes with a summary of results and their implication for future work in this field. The program listing in Appendix 2 forms an integral part of this thesis, and some effort was taken to ensure that it would be readable.
AD-655 923 HC$3.00 MF$0.65

IMPACT OF MODERNIZATION IN THE PHILIPPINES.
Pennsylvania State Univ University Park
For primary bibliographic entry see Field 5K.
AD-656 122 HC$3.00 MF$0.65

EFFECTS OF GRAMMATICAL FACTORS AND AMOUNT OF MATERIAL ON MEMORIZING PARAGRAPHS, SENTENCES, AND WORD LISTS.
George Washington Univ Alexandria Va Human Resources Research Office
For primary bibliographic entry see Field 5J.
AD-656 454 HC$3.00 MF$0.65

STUDY AND ANALYSIS OF SPEECH PARAMETERS AND BANDWIDTH COMPRESSION TECHNIQUES.
Georgia Inst of Tech Atlanta Engineering Experiment Station
For primary bibliographic entry see Field 9D.
AD-656 478 HC$3.00 MF$0.65

GRAMMATICAL FACTORS IN SENTENCE RETENTION,
Michigan Univ Ann Arbor Dept of Psychology
For primary bibliographic entry see Field 5J.
AD-656 541 Not available from CFSTI.

SOME THINKING ABOUT 'SYSTEM',
Rand Corp Santa Monica Calif
N. Jordan. 30 Dec 60, 33p Rept no. P-2166

Descriptors: (*Semantics, Theory), Reasoning, Classification, Systems engineering, Organizations, Perception (Psychology).

The paper attempts to dispell some of this confusion involving the word 'system'. It attempts to show that 'system' is semantically legitimate per se, despite its many specific meanings by: (a) reviewing some obvious but neglected facts of perception and cognition; (b) explicating an implication of these facts -- the 'core meaning' of a word; (c) trying to show that the many definitions of 'system' are correct applications of the core meaning of 'system' to concrete cases; (d) formulating a possible taxonomy of these applications.
AD-656 679 HC$3.00 MF$0.65

5H. Man-Machine Relations

EVALUATION OF THREE COMPUTER-COMPATIBLE PROCEDURES FOR USING IMAGE INTERPRETER KEYS.
Technical research note,
System Development Corp Falls Church Va
Richard S. Layman. Jun 67, 46p
BESRL-TRN-186
Contract DA-49-092-ARO-65

Descriptors: (*Target discrimination, Man-machine systems), (*Pattern recognition, Digital computers), Input-output devices, Simulation, Army personnel, Performance (Human), Images.

Under monitorship of the MAN-COMPUTER FUNCTIONS Task, personnel of the System Development Corporation and the U. S. Army Behavioral Science Research Laboratory jointly conducted a study to evaluate three computer-compatible methods of identifying the image interpretation reference keys most pertinent to a given identification problem. Thirty-two enlisted image interpreters having training experience with imagery showing foreign terrain and targets were subjects for the study. Simulated computer procedures were devised in which the interpreters selected target signatures appearing on checklists as a means of designating the target category and finally the key or keys desired. Results of the experiment showed: (1) Target identification by means of a reference key was as fast and as accurate with computer-compatible procedures of key selection as with the manual procedure; (2) Interpreters tended to base selection of a key on only one or two signatures even when use of additional signatures would have increased probability of valid key selection; (3) Interpreters preferred viewing more than one key before final identification of a target; (4) No significant differences in speed and accuracy of identification were found under any of the procedures when using the two levels of imagery quality.

AD-655 856 HC$3.00 MF$0.65

HUMAN INFORMATION-PROCESSING CONCEPTS FOR SYSTEM ENGINEERS,
Michigan Univ Ann Arbor Dept of Psychology
Richard W. Pew. 1965, 19p
AFOSR-67-1799
Contract AF 49 (638)-1235
Availability: Published in System Engineering Handbook p31-3-31-17 1965.

Descriptors: (*Man-machine systems, Systems engineering), (*Human engineering, Man-machine systems), Memory, Decision making, Data processing systems, Psychophysics, Perception (Psychology).

A design philosophy is presented for utilizing information about human performance capacities and limitations in the design of man-machine systems. Specific data concerning man's capabilities for psychophysical judgment, speeded information processing, memory storage and perceptualmotor skills are surveyed and described in engineering terms where applicable. The veiw of man as a single channel limited capacity information processing system is advocated. (Author)

AD-656 533 Not available from CFSTI.

RECENT PSYCHOLOGICAL RESEARCH RELEVANT TO THE HUMAN FACTORS ENGINEERING OF MAN-MACHINE SYSTEMS,
Michigan Univ Ann Arbor Dept of Psychology
Richard W. Pew. 1965, 7p
AFOSR-67-1824
Contract AF 49 (638)-1235
Availability: Published in Proceedings of the National Electronics Conference 5p Oct 1965.

Descriptors: (*Man-machine systems, *Human engineering), Design, Systems engineering, Memory, Psychology, Bionics, Data processing systems, Decision making.

The emphasis of the report was to survey a body of psychological theory and to illustrate a specific area in which the theory and associated empirical data are relevant to system design problems. Within the framework describing man as a single-channel information processor at least, there are other equally relevant bodies of data. For example, research on the functional characteristics of the memory subsystem, especially short-term memory are available to allow relatively precise specifications of tolerable memory load, given the nature of the material to be remembered. This literature would also suggest information format and coding for optimum recall or retreval. Similarly, the accumulating body of data focused on engineering descriptions of man as a controller in feedback systems are available for those with problems in this area. In short it is the contention of the paper that one should not retreat to the comfort of his armchair and its associated intuitive design techniques without first making a conscientious effort to talk to psychologists about his particular design problem and to seek out the applicable literature. (Author)

AD-656 653 Not available from CFSTI.

HUMAN PERFORMANCE IN INFORMATION PROCESSING AND STORAGE.
Michigan Univ Ann Arbor Dept of Psychology
For primary bibliographic entry see Field 5J.

AD-656 709 HC$3.00 MF$0.65

5I. Personnel Selection, Training, and Evaluation

NEW APPROACHES TO MESS COOK MANAGEMENT AFLOAT.
Final rept.,
Naval Personnel Program Support Activity, Washington, D. C. Personnel Research Lab.
Thomas B. Turner. Jan 66, 57p WRM-66-28

Descriptors: (*Food dispensing, *Personnel management), Technicians, Cruisers, Naval personnel, Naval training, Shipborne, Management planning, Job analysis.

An exploration was made of new ways of managing mess cooking afloat and, specifically, the management system presently in use aboard the U. S. S. ALBANY (CG-10). Aboard many ships, Class A, technically trained personnel are diverted to mess cooking duties when non-designated SN or FN are unavailable. The ALBANY plan and plans similar to it permit such personnel to work in their rating or continue OJT by establishing a messmen division of non-designated strikers. Benefits of such a plan are increased morale of technical personnel, more efficient food service management, and increased apprenticeship opportunity for personnel interested in a Supply career. The ALBANY and similar systems offer a sound solution and effective remedy to the diversion of technically trained personnel to mess duty. (Author)

AD-477 671 HC$3.00 MF$0.65

JOB EVALUATION: A PRELIMINARY ANALYSIS OF ITS APPLICATION TO NAVY ENLISTED BILLETS,
Naval Personnel Program Support Activity, Washington, D. C. Personnel Research Lab.
Alexander J. Rose, and Francis L. McTavish. Jan 66, 68p WRM-66-27

Descriptors: (*Job analysis, *Naval personnel), Marine corps, Personnel management, Manpower studies, Research program administration, Feasibility studies.

A discussion is presented of some of the problems that may be encountered in the course of developing a billet evaluation system for Navy enlisted billets. Included is an assessment of the Marine Corps billet evaluation system. Job evaluation in the modern Navy is a complex problem. Advancements in technology, as well as in strategic and tactical planning, have given rise to problems of such magnitude in personnel administration as to require management tools capable of coping with the vast number and diversity of skills employed in today's Navy.

AD-477 724 HC$3.00 MF$0.65

PERSONNEL COSTS FOR TEN SELECTED RATINGS (AC, AE, AQ, AT, AX, ET, FT, MM, RD, ST),
Naval Personnel Program Support Activity, Washington, D. C. Personnel Research Lab.
James N. Clary, and Simon Arzigian. Apr 65, 121p WRM-65-2

Descriptors: (*Manpower studies, *Naval personnel), Management engineering, Job analysis, Wages, Military training, Military personnel, Operators (Personnel), Aviation personnel, Aerial gunners, Sonar personnel, Radar operators, Electronic technicians, Costs.

The report is designed to meet the urgent need of the Secretary of the Navy's Task Force on Military Personnel Retention for personnel costs for 10 selected ratings. Cost information in this report should prove useful to other consumers as well. The ratings reported on are the AC, AE, AQ, AT, AX, ET, FT, MM, RD and ST. Four of these ratings (AC, AE, AQ, AX) have not been reported on previously. The personnel costs presented are based on the latest available information and reflect all known adjustments.

AD-482 119 HC$3.00 MF$0.65

OFFICER PERSONNEL COSTS: NAVAL ACADEMY GRADUATE,
Naval Personnel Program Support Activity, Washington, D. C. Personnel Research Lab.
James N. Clary. Apr 65, 63p WRM-65-3

Descriptors: (*Officer personnel, Costs), Naval personnel, Naval aviation, Submarine personnel, Job analysis, Achievement tests, Selection, Naval training, Cost effectiveness.

Costs are presented for a Naval Academy graduate from initial procurement through one year past initial service obligation or obligation as extended because of submarine, nuclear power, or flight training. Fact sheets setting forth per capita costs for the following career patterns are provided for officer directly to sea duty, naval aviator, conventional submarine officer, and nuclear powered submarine officer. The personnel costs presented are based on the latest available information.

AD-483 342 HC$3.00 MF$0.65

OFFICER PERSONNEL COSTS: NROTC-REGULAR NROTC-CONTRACT,
Naval Personnel Program Support Activity, Washington, D. C. Personnel Research Lab.
James N. Clary. May 65, 56p WRM-65-6

Descriptors: (*Officer personnel, Costs), Naval personnel, Armed forces reserves, Cost effectiveness, Submarine personnel, Aviation personnel, Training, Wages.

Costs are presented for officers procured through the Naval Reserve Officers Training Corps, Regular and Contract Programs, from initial procurement through one year past initial service obligation or initial service obligation as extended because of flight, submarine, or submarine and nuclear power training. Fact sheets setting forth per capita costs for the following career patterns are provided for officer directly to surface ship, naval aviator, conventional submarine officer, and nuclear powered submarine officer.

AD-483 343 HC$3.00 MF$0.65

OFFICER PERSONNEL COSTS: NAVAL AVIATION CADET (NAVCAD),
Naval Personnel Program Support Activity, Washington, D. C. Personnel Research Lab.
James N. Clary. Nov 65, 37p WRM-66-14

Descriptors: (*Naval personnel, Costs), (*Aviation personnel, Costs), Navy, Naval training,

Wages, Pilots, Research program administration, Personnel management, Officer personnel.

The report presents the cost of officers procured through the Naval Aviation Cadet (NAVCAD) Program, from procurement through one year past initial active service obligation. Computations of basic pay and flight pay reflected in previous officer personnel cost reports were based on actual pay due the individual according to length of service. However, commencing with this report the computation of post-commissioning basic and flight pay is based on the Navy Basic Standard Military Compensation Rate Table, NavCompt Manual. This table establishes average rates of pay for each pay grade. The monthly rate of basic pay was recently updated by DOD to reflect the military pay raise effective 1 September 1965.
AD-483 425 HC$3.00 MF$0.65

PRELIMINARY VALIDITY REPORT OF THE MOS EVALUATION TEST FOR FIELD RADIO REPAIRMAN, MOS CODE 31E40,
Army Enlisted Evaluation Center Indianapolis Ind
Daniel B. Corts. Jun 67, 35p Rept no. Technical Research Study-88

Descriptors: (*Maintenance personnel, Selection), (*Psychometrics, Maintenance personnel), Radio equipment, Reliability, Statistical analysis, Test construction (Psychology).
Identifiers: Evaluation, Personnel screening tests.

Statistical bases were provided to allow control, in test revision, over the evaluation test characteristics of mean, standard deviation, reliability, and validity. The evaluation test characteristic of validity was given special attention. Increasing the validity of an evaluation test was considered at both the item and the test outline levels. The following conclusions are drawn from the study of the November 1966 MOS evaluation test for Field Radio Repairman, MOS Code 31E40: (1) The total evaluation test had a validity coefficient of .48 (significant at the .01 level); (2) optimal weighting of BSMA's did not significantly increase the validity of the total evaluation test; and (3) further increases in validity should be expected in future administration with proper item selection. (Author)
AD-655 848 HC$3.00 MF$0.65

PRELIMINARY ASSESSMENT OF THREE NCO LEADERSHIP PREPARATION TRAINING SYSTEMS.
Technical rept.,
George Washington Univ Alexandria Va Human Resources Research Office
Paul D. Hood, Morris Showel, John E. Taylor, Edward C. Stewart, and Jacklyn Boyd. Jun 67, 68p Rept no. TR-67-8
Contract DA-44-188-ARO-2

Descriptors: (*Army training, *Leadership), Morale, Attitudes, Factor analysis, Performance tests, Selection, Military training.
Identifiers: Noncommissioned officers.

Three alternative leadership training systems were studied as a preliminary to formal evaluation of what might be the most feasible method of meeting Army needs for identifying and training potential junior NCOs as early as possible in their Army careers. Training objectives were defined for each system along with training materials and methods. A second, coordinated activity was directed toward developing assessment devices to support training or to evaluate training accomplished in each system. Considerable information was obtained regarding the kinds of environmental conditions which are most conducive to successful leadership training, factors which affect trainee leader morale and attitudes, acceleration or compression of some technical instruction, relation of selection variables to subsequent performance, and the relative merits of three different methods of presenting leadership training in connection with the Advanced Individual Training (AIT) program. Overall, it was determined that presentation of formal leadership training in a separate course between Basic Combat Training and AIT, followed by practical, on-the-job leadership training in the AIT cycle showed the most value and promise as a leadership training system. (Author)
AD-655 887 HC$3.00 MF$0.65

ADMINISTRATIVE TRAINING AND RESEARCH USING SMALL GROUP EXERCISES. I. COMBINING MANAGEMENT TRAINING AND RESEARCH. II,
Pittsburgh Univ Pa Management Research Center
Bernard M. Bass. 1966, 13p Rept no. MRC-Reprint-67-1, MRC-Reprint-67-2
Research supported in part by NONR.
Availability: Published in Pittsburgh Business Review v37 n4 p1-4 Apr 1967 and Training and Development Journal 6p Apr 1966.

Descriptors: (*Personnel management, *Training), Decision making, Simulation, Organizations, Performance (Human), Group dynamics, Training devices, Supervisory personnel, Management engineering.

A series of simulated organizational experiences of approximately 40 hours, originally developed for administrative trainees, were designed to permit small groups to conduct the exercises and evaluate their experiences by themselves. The materials are integrated with lectures and readings. The exercises, most of which are controlled experiments, provide useful research information. Systematic differences in performance are observed between training groups of middle managers, technicians and administration students as well as between groups from different countries. Moreover, consistent patterns of behavior are seen for individuals and groups as they proceed through the series of exercises. A program of cooperative research for transnational studies of management behavior is underway. (Author)
AD-655 992 Not available from CFSTI.

RELATIONSHIP OF AFOQT SCORES TO MEASURES OF SUCCESS IN UNDERGRADUATE PILOT AND NAVIGATOR TRAINING,
Personnel Research Lab Lackland AFB Tex
Robert E. Miller. Oct 66, 35p Rept no. PRL-TR-66-14

Descriptors: (*Aviation personnel, Selection), Pilots, Navigators, Training, Performance tests.

Scores on the Pilot, Navigator-Technical, and Officer Quality composites of the Air Force Officer Qualifying Test (AFOQT) were compared with measures of success in undergraduate pilot and navigator training. The samples consisted of 4,993 student pilots and 2,132 student navigators who entered training over a period of approximately two years. Each sample was subdivided according to source of commission and, in the case of the pilot sample, by type of aircraft and curriculum. Correlations of AFOQT composite scores with criteria of success were computed within each of 16 samples and subsamples thus defined. Criteria were training grades and graduation vs. elimination by various categories. Selected validity coefficients were corrected for range restriction in 4 samples. In general, there was good prediction of training grades, academic elimination, flying deficiency elimination, and elimination for all reasons combined. Elimination for motivational reasons was predictable in some groups. Military elimination occurred infrequently but was negatively predictable in the total navigator sample. (Author)
AD-656 303 HC$3.00 MF$0.65

IMPACT OF THE COMPUTER ON JOB ANALYSIS IN THE UNITED STATES AIR FORCE,
Personnel Research Lab Lackland AFB Tex
Joseph E. Marsh, and Raymond E. Christal. Oct 66, 25p Rept no. PRL-TR-66-19

Descriptors: (*Job analysis, Computers), (*Automation, Air Force), Air Force personnel, Inventory control, Data processing systems, Computer programs, Reviews, Performance (Human), Management planning, Sampling.

In keeping with present trends toward the automation of personnel information, the Air Force method of job analysis provides for the exploitation of advances in electronic computer technology. Computer capability is applied not only in the analysis of job inventory data but also in the construction, administration, and publication phases of the procedure. During inventory construction the computer is used to prepare alphabetic lists of tentative task statements according to pertinent key words. This grouping by topic facilitates the detection of redundancy and insures the elimination of duplicate statements. In the administration phase, the computer selects the required sample of job incumbents from current personnel rosters maintained on magnetic tape. In addition, the computer prints names and addresses on appropriate labels to attach to inventories for mailing. It is in the area of occupational data analysis, however, that the computer makes its most impressive impact. By application of a complex program consisting of over 50,000 instructions, those incumbents in a survey sample who perform essentially the same job are grouped together, and a job description composed of duties and tasks is published for each such job type identified. The computer also lists information available for each case and reports means, standard deviations, and distributions of values for specified variables. Composite job descriptions may also be obtained for any group defined in terms of job-related variables such as grade, specialty, years of experience, or specialized training. (Author)
AD-656 304 HC$3.00 MF$0.65

A STUDY OF SIMULATOR CAPABILITIES IN AN OPERATIONAL TRAINING PROGRAM.
Final rept. May 65-Aug 66,
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
Donald E. Meyer, Ralph E. Flexman, E. A. Van Gundy, David C. Killian, and C. J. Lanahan. May 67, 54p Rept no. AMRL-TR-67-14

Descriptors: (*Flight simulators, Effectiveness), Training, Pilots, Teaching methods, Training devices, Questionnaires, Performance (Human).

The experiment was conducted to determine the effects of simulator training to criterion proficiency upon time required in the aircraft. Data were also collected on proficiency levels attained, self-confidence levels, individual estimates of capability and sources from which that capability was derived. Subjects for the experiment were 48 airline captains transitioning into the DC-8 aircraft. The subjects were equally assigned to experimental and control treatment groups. Subjects in the experimental group were trained in the DC-8 simulator for as much time as required to satisfy their instructors that they could perform the required maneuvers in the simulator at the same level of proficiency required to pass the final qualifications check in the aircraft. The control group was trained using the standard curricula which required a fixed time in the simulator. Data obtained from student reactions to questionnaire items are interpreted to indicate that: (1) simulators can be used to further reduce requirements for training time in aircraft; and (2) simulators can be used to evaluate performance that is indicative of performance in the aircraft. (Author)
AD-656 308 HC$3.00 MF$0.65

AN EXPERIMENT IN BASIC AIRBORNE ELECTRONICS TRAINING. PART II. EFFECT OF RE-

DUCTION IN TRAINING TIME UPON KNOWLEDGE OF RADAR MAINTENANCE.
Naval Personnel Research Activity San Diego Calif
For primary bibliographic entry see Field 5J.
AD-656 436 HC$3.00 MF$0.65

PERSONNEL IMPLICATIONS OF NEW TECHNOLOGICAL DEVELOPMENTS, MICROELECTRONICS AND AUTOMATION.
Naval Personnel Research Activity San Diego Calif
For primary bibliographic entry see Field 9C.
AD-656 452 HC$3.00 MF$0.65

COMPARISONS OF NAVAL DRAFTEES AND ENLISTEES.
Final rept.,
Naval Personnel Program Support Activity Washington D C Personnel Research Lab
Aaron Katz. Jun 67, 25p Rept no. WRM-67-57

Descriptors: (*Naval personnel, Recruiting), Selection, Statistical data, Psychometrics, Wages, Aging (Physiology), Classification.

Draftees and enlistees in the USN, all of whom had come into the Navy in October 1965 without prior military service, were compared as of 30 June 1966 on thirteen variables (primary and secondary dependency, citizenship, year of birth, BTB and special test scores, and rate). Draftees were found to have included a significantly higher percentage than enlistees with primary and secondary dependents, and a significantly larger percentage of immigrant aliens who had declared their intention of becoming citizens. Draftees also were significantly older than enlistees, but had not achieved as high a rate (pay grade) as enlistees. Draftees had received lower test scores than enlistees; the differences between all but two of the eight tests (Clerical and Electronics Technician Selection Tests) were statistically significant. All of the statistically significant differences between draftees and enlistees, except for perhaps primary dependency, were of such small magnitude as to be of little or no practical significance. (Author)
AD-656 580 HC$3.00 MF$0.65

ON-THE-JOB TRAINING COSTS: AN ANALYSIS,
Naval Personnel Program Support Activity Washington D C Personnel Research Lab
Simon Arzigian. Jun 67, 44p Rept no. WRM-67-52

Descriptors: (*Naval training, Costs), Personnel management, Naval personnel, Learning, Wages.
Identifiers: On-the-job training.

The study presents the results of a preliminary investigation of the feasibility of computing on-the-job training costs. For the purpose of this study on-the-job training is that which involves learning or improving job performance under actual working conditions. At present there is no system within the Navy to 'cost out' on-the-job training. Training cost reporting is limited to formal, or school, training. The addition of an on-the-job training cost to the school cost (if any) would provide a more 'complete' training cost. Training costs play a major part in many personnel management decisions; therefore a training cost which reflects all the training provided an individual would prove valuable. (Author)
AD-656 581 HC$3.00 MF$0.65

COMPUTER-ADMINISTERED INSTRUCTION VERSUS TRADITIONALLY ADMINISTERED INSTRUCTION: ECONOMICS,
George Washington Univ Alexandria Va Human Resources Research Office
Felix F. Kopstein, and Robert J. Seidel. Jun 67, 43p Rept no. Professional Paper 31-67
Contract DA-44-188-ARO-2
Presented at the National Society for Programmed Instruction, Boston, Mass., April 1967.

Descriptors: (*Teaching methods, Cost effectiveness), Computers, Instructors, Programmed instruction, Economics, Education, Military training, Programming (Computers).

An attempt is made to assay the economics of computer-administered instruction (CAI) versus traditionally administered instruction (TAI) in controlling the structure of the learner's stimulus environment in teaching and training situations. There is a discussion of the need for a sound, objective economic appraisal of the value to society as a whole of increments in the breadth and depth of education in the population, and of the influence of varying rates with which these increments are brought about. The necessity for reliable, objective information concerning cost data is emphasized. Projected cost/effectiveness comparisons based on the assumption of equal effectiveness for CAI and TAI are discussed for both civilian and military instruction. (Author)
AD-656 613 HC$3.00 MF$0.65

VOICE COMMUNICATION: RETENTION OF IMPROVED INTELLIGIBILITY,
Purdue Research Foundation Lafayette Ind
For primary bibliographic entry see Field 17B.
AD-656 629 HC$3.00 MF$0.65

EFFECT OF LEVEL OF DISTRACTING NOISE UPON SPEAKING RATE, DURATION, AND INTENSITY.
Purdue Research Foundation Lafayette Ind
For primary bibliographic entry see Field 17B.
AD-656 630 HC$3.00 MF$0.65

TRAINING AND SUPERVISION OF CONTROLLERMEN.
Technical rept.,
Dunlap and Associates Inc Stamford Conn
Ralph C. Channell. 7 Apr 50, 19p
SPECDEVCEN-641-2-7
Contract N8onr-641 (02)

Descriptors: (*Submarine personnel, *Naval training), (*Supervision, Submarine personnel), Control, Human engineering, Submarines, Marine propulsion, Performance (Human), Instruction manuals.

The report is concerned with the problem of improving Controllerman performance. The recommendations are divided into two sections: initial indoctrination of the Controllerman, largely at the Submarine School, and the subsequent supervision during service at sea. It is recommended that the newly trained Controllerman be carefully guided and supervised during his initial tour of sea duty with an emphasis upon correct hand allocation, proper sequence of controller manipulation, and prompt, positive action. It is also recommended that the dials of related instruments and controllers aboard all submarines be identified with colored borders similar to those recommended for the Propulsion Cubicle at the Submarine School. In order to provide added incentive for continued practice and improvement, it is recommended that expert Controllermen be given a special 'Controller qualification' entry in their service record upon passing a practical examination. The essential nature of this examination should conform to the tests used at the Submarine School, and should include the following criteria: accuracy of performance, proper hand allocation to levers, correct sequence of movements, and standard times for various problems. (Author)
AD-656 632 HC$3.00 MF$0.65

A STUDY OF THE UTILIZATION AND DESIGN OF THE SPECIAL DEVICES CENTER MARK 18 MODEL 6 GUNSIGHT TRAINER (DEVICE 3-A-40b PROTOTYPE).
Technical rept.,
Dunlap and Associates Inc Stamford Conn
Joseph F. Weigandt, Edward W. Bishop, and Ralph C. Channell. 9 Dec 53, 62p
SPECDEVCEN-1043-00-2
Contract Nonr-1043 (00)

Descriptors: (*Gunnery trainers, Design), Effectiveness, Military training, Costs, Training films.

The report describes an evaluation of the device for its training effectiveness. Phase I describes utilization of the trainer and design modifications for achieving maximum effectiveness; Phase II describes a study to determine the effect of synthetic training on performance in an actual operational situation. There are no differences in the coordinating performance of the Air-trained and Trainer-trained groups. Gunnery training on the synthetic device is recommended on the basis of the training time conserved, the reduction of training problems such as those due to scheduling and weather conditions, and the economy of cost of the training program. Recommendations for efficient utilization of the trainer are specified. These are related to such features as length of the training period, number of trials required for maximum performance, the utility of tolerance levels and the influence of certain motivational factors. Recommendations for redesign of the equipment are presented. These include items pertaining to the layout of the instructor's console, mock-ups of the sight and turret, and use of the training film. (Author)
AD-656 633 HC$3.00 MF$0.65

A RATE OF TURN DEVICE FOR USE WITH THE 15-J-4-q MOVING RADAR TARGET GENERATOR: ITS DESIGN AND EVALUATION.
New York Univ N Y
For primary bibliographic entry see Field 17I.
AD-656 634 HC$3.00 MF$0.65

RATINGS, COMMENTS AND RECOMMENDATIONS FOR SPECIFIC TRAINING AIDS EMPLOYED IN THE ARMY TRANSPORTATION COMPANY OFFICERS COURSE.
Technical rept.,
Psychological Research Associates Inc Arlington Va
John A. Scopino, Walter B. Gartner, Frank E. Manning, and Harry J. Older. 30 Jun 56, 139p
NAVTRADEVCEN-1927-00-2-Suppl
Contract Nonr-1927 (00)

Descriptors: (*Training devices, Army equipment), Army personnel, Transportation, Officer personnel, Army training, Analysis, Optimization.

The research was undertaken in order to determine the optimum utilization of the current training aids and devices and to recommend new and/or improved training aids wherever it was deemed necessary. The report contains completed rating forms for each of the 150 training aids employed in the Transportation Company Officers Course. Comments and specific recommendations for each training aid are also included.
AD-656 635 HC$3.00 MF$0.65

ADVANCES IN THE USE OF COMPUTERS FOR HANDLING HUMAN FACTORS TASK DATA,
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 5E.
AD-656 701 HC$3.00 MF$0.65

SOME MOTIVATIONAL DETERMINANTS OF RACIAL DIFFERENCES IN INTELLECTUAL ACHIEVEMENT.
Michigan Univ Ann Arbor
For primary bibliographic entry see Field 5J.
AD-656 723 Not available from CFSTI.

THE SOCIALIZATION OF ACADEMIC MOTIVATION IN MINORITY GROUP CHILDREN.
Technical rept.,
Michigan Univ Ann Arbor
Irwin Katz. Jun 67, 75p Rept no. TR-3
Contract N00014-67-A-0181-0004
Availability: Published in Nebraska Symposium on Motivation 1967.

Descriptors: (*Education, Motivation), (*Children, Education), (*Social psychology, Education), Adults, Behavior, Culture, Sociology, Anxiety, Sociometrics, Performance (Human), Instructors, Adjustment (Psychology), Attitudes, Defense mechanisms (Psychology), Perception (Psychology).
Identifiers: Negroes.

The basic proposition of this paper is that the child's capacity for sustained academic effort depends heavily upon an internalized mechanism of affect-mediating self-evaluations. Pilot research encourages the belief that this is a core motivational process, the study of which can provide a fruitful scientific entry into the problem of widespread academic failure among socially underprivileged children in the United States. In a task situation of subjective privacy, Negro boys who were academically successful or unsuccessful displayed sharply different patterns of covert reaction to their own performances, even when the latter did not differ in objective quality. Moreover, poor pupils seemed to develop an avoidance reaction to stimuli that were experimentally associated with experiences of self criticism. The fact that boys' self-evaluations were related not only to academic status, but also to anxiety level, and to perceptions of parental reinforcement behaviors, is further grounds for thinking that the new research method taps a basic self-regulatory process underlying academic striving. By assessing the self-regulatory process, and relating its characteristics to classroom performance, on one hand, and to school and home-background variables on the other hand, it may be possible to test adequately for the first time a broad range of hypotheses regarding the sources of the disadvantaged pupil's motivational difficulties. (Author)
AD-656 724 Not available from CFSTI.

METHODS AND PROBLEMS OF COMPUTATION OF ENLISTED PERSONNEL COSTS,
Naval Personnel Research Activity, Washington, D. C.
Simon Arzigian. Feb 64, 66p PRAW-64-16

Descriptors: (*Naval personnel, Costs), Statistical analysis, Tables, Problem solving, Manpower studies, Submarine personnel, Sonar personnel, Aviation personnel, Technicians, Naval procurement, Naval training, Supervisory personnel, Armed forces transportation, Wages, Naval research.

The purpose of this report is to provide, in some detail, an explanation of the methodology employed in the computation of enlisted personnel costs. Sources of information have also been indicated and an analysis of problem areas which were encountered in the course of research has been made. Personnel costs discussed in this report are by no means the only costs incurred by the Navy in the personnel costing area. For example, additional study is required in the area of training costs, particularly for the accurate valuation of amortization of expensive training equipment and the costs of on-the-job training required after school to bring personnel in various ratings to an acceptable technical level.
AD-803 758 HC$3.00 MF$0.65

INDIVIDUAL CHARACTERISTICS SIGNIFICANT TO SALARY LEVELS OF ENGINEERS AND SCIENTISTS.
Management analysis rept.,
Stanford Research Inst., Menlo Park, Calif.
Richard P. Howell, Martin Gorfinkel, and Dale Bent. Oct 66, 104p
ODDRE-MAR-66-10
Contract DA-49-083-OSA-3272

Descriptors: (*Scientific personnel, Wages), (*Engineering personnel, Wages), Military organizations, Industrial plants, Industries, Aging (Physiology), Education, Supervision, Multivariate analysis, Tables, Questionnaires, Mathematical models.

Effective comparisons between salaries of one engineer-scientist population and those of another may be made in two ways, using equations developed in this study. The first compares the aggregate salary of a given population with the aggregate salary of the population used in developing the equations of this study. The steps necessary to make such a comparison consist in: (1) obtaining point-of-hire characteristics of the population to be compared, (2) entering the values of the variables called for in the equation developed in this study, (3) computing the sum of the salaries, and (4) comparing results with the sum of the actual salaries being paid. The second type of comparison consists in developing a regression equation concerning the population to be compared, using point-of-hire variables identical with those used in this study. The coefficients or parameters of the resulting equations may then be compared to those of the equations developed here to provide insights concerning the relative emphasis placed by management (knowingly or unknowingly) on selected characteristics of new hires. The coefficients or other parameters amount to a kind of profile, and by knowingly controlling them, a management may choose the characteristics that it wishes to stress in salary determinations. Thus the salary structure may become a more effective means to implement policy.
AD-805 809 HC$3.00 MF$0.65

THE SPRINGFIELD ARMORY PROJECT.
Realty Research and Consulting Corp., Pittsburgh, Pa.
For primary bibliographic entry see Field 5C.
PB-174 944 HC$3.00 MF$0.65

THE PROCESS OF PROFESSIONAL INFORMATION EXCHANGE AMONG SCIENCE INFORMATION SPECIALISTS.
Rowland and Co., Inc., Haddonfield, N. J.
For primary bibliographic entry see Field 5B.
PB-175 568 HC$3.00 MF$0.65

RESTORATION OF YOUTH THROUGH TRAINING.
Wakoff Research Center, Staten Island, N. Y.
For primary bibliographic entry see Field 5K.
PB-175 609 HC$3.00 MF$0.65

5J. Psychology (Individual and Group Behavior)

ESTIMATING FROM MISCLASSIFIED DATA,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5A.
AD-655 845 HC$3.00 MF$0.65

PRELIMINARY VALIDITY REPORT OF THE MOS EVALUATION TEST FOR FIELD RADIO REPAIRMAN, MOS CODE 31E40,
Army Enlisted Evaluation Center Indianapolis Ind
For primary bibliographic entry see Field 5I.
AD-655 848 HC$3.00 MF$0.65

THE MISSING DATA MATRIX,
Washington Univ Seattle
Paul Horst. Jul 67, 35p
Contract Nonr-477 (33), Grant PHS-MH-00743-12

Descriptors: (*Multivariate analysis, Psychology), (*Psychology, Mathematical analysis), Factor analysis, Mathematical models, Matrix algebra.
Identifiers: Data matrix.

The report deals with a multiple regression approach to the estimation of missing elements in a data matrix. Three types of missing data matrices are discussed and methods for their analysis are presented. Computational equations together with mathematical proofs are included. (Author)
AD-655 916 HC$3.00 MF$0.65

CONFIGURAL ANALYSIS,
Washington Univ Seattle
Leslie A. Fox. Jul 67, 25p
Contract Nonr-477 (33), Grant PHS-MH-00743-12

Descriptors: (*Multivariate analysis, Psychology), (*Psychology, Mathematical analysis), Random variables, Matrix algebra, Factor analysis.
Identifiers: Configural analysis.

Multivariate analysis in psychology is perennially criticized for its overweening reliance on linear, additive models. The critical viewpoint holds that the convenience of linear functions of first degree variables is purchased, in many situations, at the expense of accuracy and heuristics. The area of configural analysis is concerned with providing remedies for these asserted deficiencies by developing means for seeking out and coping with nonlinearity and nonadditivity. The two main approaches in this area may be termed analysis among entities and analysis among attributes. The purpose of this paper is to examine the major developments of the two approaches, with emphasis on the second. (Author)
AD-655 921 HC$3.00 MF$0.65

TECHNIQUES FOR INVESTIGATION OF THE STRUCTURE OF INDIVIDUAL DIFFERENCES IN PSYCHOLOGICAL PHENOMENA.
Final rept. 1 Sep 61-31 Aug 66,
Illinois Univ Urbana Dept of Psychology
Ledyard R. Tucker. Jul 67, 8p
Contract Nonr-1834 (39)

Descriptors: (*Psychometrics, Factor analysis), Bibliographies, Decision making, Behavior, Learning.

The research activity led to a number of contributions of techniques for systematic study of individual differences in psychological phenomena. Much of this research was theory-oriented involving appropriate statistical and mathematical forms and computational procedures. In order to assess properties of procedures and validity of results, experimental trials were conducted of each technique considered using both simulated data and real observations. Work was concentrated on situations involving multiple observations of behavior of individuals. This emphasis led to consideration of various properties, applications, and extensions of factor analysis. The work of Professor Ledyard Tucker on determination of parameters of a functional relation by factor analysis was extended and applied to studies in psychological scaling, learning phenomena, and human judgment. A significant development involved the extension of factor analytic techniques from being limited to two-way tables of data to cases in which the data may be classified in three or more ways, or 'modes of classification'. (Author)
AD-655 930 HC$3.00 MF$0.65

SOCIAL PRESSURE IN THE MODIFICATION AND DISTORTION OF JUDGMENT, A CROSS-ULTURAL STUDY,

North Dakota State Univ Fargo Dept of Psychology
James O. Whittaker, and Robert D. Meade. Aug 67, 8p
AFOSR-67-1722
Grant AF-AFOSR-762-65
Prepared in cooperation with Western Washington State College.
Availability: Published in International Journal of Psychology, v2 n2 p109-13 1967.

Descriptors: (*Social psychology, *Conformity), Culture, Attitudes, Behavior, Decision making.
Identifiers: Cross culture (Sociology).

A replication of Asch's study of the effects of social pressure on conforming behavior in Brazil, Lebanon, Rhodesia, and Hong Kong revealed that only Rhodesian Africans showed a significantly greater conforming tendency. The other groups were approximately equal in susceptibility to social pressures for conformity, and they did not differ significantly from the data obtained by Asch in the U. S. Additional research is needed to reveal why the Rhodesian Africans yielded significantly more than those subjects in other cultures. (Author)
AD-655 975 Not available from CFSTI.

TACTILE SPATIAL AFTEREFFECT OR ADAPTATION LEVEL,
Western Australia Univ Nedlands Dept of Psychology
A. J. Gilbert. 19 Feb 66, 8p
AFOSR-67-1736
Grant AF-AFOSR-968-65
Availability: Published in Journal of Experimental Psychology v73 n3 p450-55 1967.

Descriptors: (*Sensory perception, *Touch), Skin, Sensitivity, Adaptation (Physiology), Psychophysics, Decision making, Australia.

A tactile spatial aftereffect from cutaneous stimuon the anterior surfaces of the forearms was claimed in a recent report. It was demonstrated in the present study that covariation of the stimulators employed to induce the aftereffect and the series of comparison stimuli used in measuring it, confounded the results of the previous experiment and that most of the variance was due to adaptation to the different series. It is suggested also that the remaining variance possibly was not due to tactile stimulation. (Author)
AD-655 976 Not available from CFSTI.

A COMPUTER-LINKED RUNWAY FOR REAL TIME OPERATION,
Western Australia Univ Nedlands Dept of Psychology
Ian G. Nicholls. 1967, 4p
AFOSR-67-1751
Grant AF-AFOSR-968-65
Availability: Published in Psychon Sci v7 n9 p319-20 1967.

Descriptors: (*Psychometrics, Data processing systems), (*Time sharing, Experimental design), Real time, Costs, Input-output devices, Computer programs, Rats, Runways, Velocity, Reliability.
Identifiers: On-line systems.

The paper outlines a system for recording the running times of rats in a straight runway using a time-shared computer. A description is given of the hardware and software used, and the advantages of the system are discussed. (Author)
AD-655 978 Not available from CFSTI.

COMPENSATION FOR AUDITORY RE-ARRANGEMENT IN HAND-EAR COORDINATION,
Tufts Univ Medford Mass
Sanford J. Freedman, Lynn Wilson, and Jerold H. Rekosh. Jul 67, 6p
AFOSR-67-1725
Contract AF 49 (638)-1282
Availability: Published in Perceptual and Motor Skills v24 p1207-10 1967.

Descriptors: (*Auditory perception, Motor reactions), Position finding, Hearing, Behavior, Hands, Ear, Auditory signals.

Ten Ss pointed at concealed auditory targets while listening through a pseudophone which produced 20 degree functional rotation of the interaural axis. After short exposures listening to a sound source held in one hand while moving that hand about, large and significant corrective shifts in pointing were measured. (Author)
AD-655 983 Not available from CFSTI.

ADMINISTRATIVE TRAINING AND RESEARCH USING SMALL GROUP EXERCISES. I. COMBINING MANAGEMENT TRAINING AND RESEARCH. II,
Pittsburgh Univ Pa Management Research Center
For primary bibliographic entry see Field 5I.
AD-655 992 Not available from CFSTI.

THE COLLATERAL PRETRAINING OF SPACED RESPONDING,
Naval Medical Research Inst Bethesda Md
Ladd Wheeler, and Hank Davis. 1967, 4p
Availability: Published in Psychon Sci v8 n7 p281-2 1967.

Descriptors: (*Conditioned reflex, Training), Time, Reaction (Psychology), Behavior.

Long Evans rats obtained a high frequency of reinforcement during initial exposure to a schedule which reinforced only responses spaced by at least 10 sec (DRL 10) provided this schedule was part of a two lever concurrent Fixed Ratio-DRL 10 schedule on which (1) the animal had received Fixed Ratio pretraining and (2) the animal needed 10 or more sec to complete the ratio requirement. Subsequent removal of the ratio lever resulted in marked disruption of spaced responding, although removal of Fixed Ratio reinforcement did not affect spaced responding. (Author)
AD-656 131 Not available from CFSTI.

BIOCHEMICAL STUDIES OF NEURONS AND GLIA DURING LEARNING AND DIFFERENT FUNCTIONAL CONDITIONS.
Goteborg Univ (Sweden) Inst of Neurobiology
For primary bibliographic entry see Field 6A.
AD-656 138 HC$3.00 MF$0.65

EFFECTS OF TEMPORAL UNCERTAINTY ON WATCHKEEPING PERFORMANCE,
Louisville Univ Ky
Richard P. Smith, Joel S. Warm, and Earl A. Alluisi. 5 Jul 66, 7p
Contract DA-49-193-MD-2567
Availability: Published in Perception and Psychophysics v1 p293-9 1966.

Descriptors: (*Attention, Performance (Human)), Uncertainty, Visual perception, Visual signals, Psychophysics, Reaction (Psychology), Reflexes, Statistical analysis.

Two experiments were conducted to assess the relative effects of signal density and regularity on watchkeeping performance. In Experiment I, three levels of density (6, 24, and 96 signals/hr.) were combined factorially with three levels of variability (coefficients of variation of 0.01, 0.10, and 1.00), and 10 Ss were assigned at random to each of the nine conditions. In Experiment II, five levels of density (6, 12, 24, 48 and 96 signals/hr.) were combined with the same three levels of variability, and 13 Ss were assigned to each condition. Each S monitored a visual 'blinking-lights' display for an hour under instructions to detect and report the occurrence of certain 'critical signals,' i.e., arrests of alternation of the lights. Response times (RT's) to correctly detected signals in both experiments decreased as a linear function of logarithmic increases in signal density. An uncertainty metric, the signal surprisal due to density, was derived, and the watchkeeper's RT was expressed as an increasing linear function of this measure of temporal uncertainty. Interpretation of these and other data support a functional, psychophysical approach to the study of watchkeeping behavior. (Author)
AD-656 139 Not available from CFSTI.

AN EXPERIMENTAL INDIRECT TECHNIQUE FOR THE INDUCTION OF HYPNOSIS WITHOUT AWARENESS,
Pennsylvania Hospital Philadelphia Unit for Experimental Psychiatry
Frederick J. Evans. 11 Nov 66, 17p
AFOSR-67-1840
Grant AF-AFOSR-707-67
Availability: Published in International Journal of Clinical and Experimental Hypnosis v15 n2 p72-85 1967.

Descriptors: (*Hypnosis, Experimental design), Perception (Psychology), Relaxation (Physiology), Behavior, Psychiatry.

A procedure is described which has been used in an experimental setting as a method of indirectly inducing hypnosis without S's awareness. Ss are not told that hypnosis is involved in the procedure, but are told they will be taught how to relax. The aim of the indirect procedure is to create different expectations and preconceptions from those normally occurring in the special hypnotic relationship. Evidence from 3 studies (samples of 63, 63, 120) indicates that the procedure successfully induces hypnosis comparable in depth to other standard hypnotic procedures. About half of the Ss test apparently do not recognize the procedure involves hypnosis. Approximately 30% of the Ss who receive the procedure, as well as 30% of the Ss in the control group who did not receive the procedure, but were tested with the same test suggestions, recognized that an attempt had been made to induce hypnosis. The perceptions about whether hypnosis was involved were unrelated to scores on typical hypnotic phenomena. It was concluded that the indirect induction technique successfully induces hypnosis and is a useful technique for manipulating S-expectations in an experimental context. (Author)
AD-656 364 Not available from CFSTI.

COMPONENTS OF DECISIONS IN A SIMULATED ENVIRONMENT.
Technical rept.,
Rutgers - the State Univ New Brunswick N J
Carl H. Castore, and Siegfried Streufert. Jun 67, 54p Rept no. TR-2
Contract N00014-67-A-0115-0002

Descriptors: (*Decision making, *Group dynamics), Factor analysis, Simulation, Performance (Human), Social psychology, Behavior.

Ten measures of decision making performance were calculated for data derived from 14 four-man groups (7 runs) of a tactical simulation. The data were factor analyzed to determine the relationships among the 10 measures, and the extent to which these measures, either singly or in combination, reflected the following aspects of decision making performance: (1) the degree of integration present in decision making; (2) the continuity over time of a strategic train of thought; (3) the interrelatedness among independent strategies; (4) the interconnectedness among aspects of a strategy; and (5) the ratio of 'quality to quantity' in decision making. The results indicated that the measures used reflected (1) the rate of decision making activity; (2) a time dimension related to integrative decision making; (3) the amount of integrative decision

making activity; and (4) the ratio of quality to quantity in decision making. The interrelatedness among strategies and the interconnectedness of the aspects of a strategy failed to emerge as aspects of performance in this analysis. This failure was related to limitations in the decision making environment used in this study and to the measurement techniques. Suggestions are offered for the measurement of the various aspects of integrative decision making in future studies. (Author)
AD-656 367 HC$3.00 MF$0.65

LEADERSHIP IN NEGOTIATIONS AND THE COMPLEXITY OF CONCEPTUAL STRUCTURE.
Technical rept.,
Rutgers - the State Univ New Brunswick N J
Siegfried Streufert, Carl H. Castore, and Susan C. Kliger. Jul 67, 20p
Contract N00014-67-A-0002

Descriptors: (*Bargaining, *Leadership), Decision making, Social psychology, Behavior, Attitudes, Personality, Simulation.

Dyad negotiation teams (homogenous in the complexity of the individuals' conceptual structure) spent several hours attempting to solve a simulated international conflict situation. Every participant repeatedly rated himself and the other participants on Stogdill's ten leadership characteristics. The dyad member with the overall highest ratings on all scales was considered the dyad's leader. The effect of simplicity and complexity of conceptual structure on the degree to which leaders display Stogdill's leadership characteristics was analyzed in an ANOV design. The interaction effect for complexity and leadership characteristics was highly significant. Complex leaders were rated higher on 'Tolerance for Uncertainty', 'Assumption of Leadership Role', 'Consideration', and 'Predictive Accuracy'. Simple leaders were rated higher on 'Initiation of Structure', 'Production Emphasis' and 'Demands Reconciliation'. (Author)
AD-656 368 HC$3.00 MF$0.65

AN EXPERIMENT IN BASIC AIRBORNE ELECTRONICS TRAINING. PART II. EFFECT OF REDUCTION IN TRAINING TIME UPON KNOWLEDGE OF RADAR MAINTENANCE.
Technical bulletin,
Naval Personnel Research Activity San Diego Calif
Alexander A. Longo, and G. Douglas Mayo. Nov 66, 18p Rept no. NPRA-STB-67-12

Descriptors: (*Naval personnel, *Naval training), (*Radar, *Maintenance), (*Electronic equipment, *Airborne), Maintenance personnel, Maintainability, Time, Reduction, Group dynamics, Performance (Human), Personnel management, Psychometrics, Statistical analysis.

The second in a series of reports on a longitudinal study pertaining to the question of whether training time can be reduced in basic airborne electronics training through judicious revision of the course. The report compares the performance of 108 students, divided into four matched groups of 27 students each, on the basis of a comprehensive test of their knowledge of certain airborne electronic equipment included in the course. The training times of the four groups were 22 weeks, 25 weeks, 27 weeks, and 30 weeks. The results indicated an overall statistically significant difference (.01 level) attributable to training time. Differences between adjacent training times were not statistically significant.
AD-656 436 HC$3.00 MF$0.65

EFFECTS OF GRAMMATICAL FACTORS AND AMOUNT OF MATERIAL ON MEMORIZING PARAGRAPHS, SENTENCES, AND WORD LISTS.
Technical rept.,
George Washington Univ Alexandria Va Human Resources Research Office
Joseph F. Follettie, and Ann F. Wesemann. Jun 67, 72p Rept no. TR-67-9
Contract DA-44-188-ARO-2

Descriptors: (*Grammars, *Recall), Memory, Factor analysis, Learning, Linguistics.
Identifiers: Psycholinguistics.

The effects of certain measurable characteristics of written material upon speed of memorization were studied. These characteristics were of four general classes: (a) load factors reflecting informational density of a selection, (b) length of the selection, in grammatical units of various kinds, (c) factors dealing with alternative, grammatically equivalent ways for presenting the same semantic material, and (d) word frequency factors. Of the four types of stimulus characteristics studied, length factors were found to have the clearest and most potent effects upon rote memorization. (Author)
AD-656 454 HC$3.00 MF$0.65

STUDIES OF MEMORY TRANSFER IN RATS.
Final rept.,
Cornell Univ Ithaca N Y Section of Neurobiology and Behavior
Frank Rosenblatt. Jul 67, 15p
Contract Nonr-401 (59)

Descriptors: (*Transfer of training, Tissue extracts), Brain, Learning, Rats, Experimental design, Behavior, Feasibility studies, Cats.

Experiments on transfer of behavioral phenomena from trained to untrained rats by means of brain extracts are described. These experiments cover standardization of test procedures, concommitant variables, subcellular localization of activity, and a pilot study with cats. (Author)
AD-656 488 HC$3.00 MF$0.65

ON THE NATURE OF SHORT-TERM MEMORY ENCODING BY THE DEAF,
Michigan Univ Ann Arbor
R. Conrad, and Mary Lou Rush. 28 Jun 65, 10p
AFOSR-67-1813
Contract AF 49 (638)-1235, Grant PHS-03388
Availability: Published in Journal of Speech and Hearing Disorders v30 n4 p336-43 Nov 1965.

Descriptors: (*Deafness, *Memory), Recall, Visual signals, Symbols, Auditory signals, Errors, Hearing, Children.

A pilot attempt was made to examine the kind of imagery used by severely deaf children in short-term memory storage of visually presented consonant sequences. The rationale of the approach was that systematic recall errors could be taken as indicative of the types of sensory coding used by subjects to hold the material in store. Subjects, both deaf and hearing controls, read briefly exposed five-consonant sequences and, at the end of each exposure, wrote down what they could recall. Error matrices for the two groups were examined. Hearing subjects made a number of systematic recall errors which could be shown to be acoustically similar to the correct letters. Deaf subjects also made certain systematic errors. These were not acoustically related to correct letters; not insofar as the data permitted reliable test could they be regarded as spatially related. The consistency of errors made by the deaf implies a consistent encoding procedure which is at present obscure. There seems, though, to be no basic methodological reason why the nature of the nature of the memory code or codes used by the deaf should not, with improved experimental procedures, be revealed. (Author)
AD-656 532 Not available from CFSTI.

HUMAN INFORMATION-PROCESSING CONCEPTS FOR SYSTEM ENGINEERS,
Michigan Univ Ann Arbor Dept of Psychology
For primary bibliographic entry see Field 5H.
AD-656 533 Not available from CFSTI.

INTERFERENCE OR DECAY OVER SHORT RETENTION INTERVALS,
Michigan Univ Ann Arbor
R. Conrad. 1967, 7p
AFOSR-67-1809
Contract AF 49 (638)-1235
Availability: Published in Journal of Verbal Learning and Verbal Behavior v6 n1 p49-54 Feb 1967.

Descriptors: (*Retention, Interference), Recall, Memory, Errors, Performance (Human), Verbal behavior, Learning.

It is well established that if a formally noninterfering task which minimizes rehearsal is interposed between presentation and recall of a short consonant sequence, recall lessens as retention interval is increased. Superficially, this appears to be a classical example of decay. Keppel and Underwood have proposed an alternative explanation in interference-theory terms suggesting that forgetting in this paradigm is due to proactive interference from extinguished associations from prior trials which recover during the retention interval. An experiment was carried out which varied retention interval after four consonants had been presented. More forgetting occurred as a result of the longer interval, but the main dependent variable was the nature of 'intrusions.' For neither the short nor long interval were wrong letters equiprobable, errors tending to be acoustically similar to the correct letter. But the distribution of long-interval errors tended more towards random than did that for the short interval. It is argued that the difference in error distribution between short and long interval is incompatible with the Keppel and Underwood explanation. A modification of decay theory is proposed which regards decay as a loss of discriminative characteristics (in the present case acoustic), and recall as a process involving discrimination of available traces. This model would be supported by the error-distribution data. (Author)
AD-656 534 Not available from CFSTI.

INDIVIDUAL DIFFERENCES AND THEORETICAL PROCESS VARIABLES: GENERAL COMMENTS ON THE CONFERENCE,
Michigan Univ Ann Arbor
Arthur W. Melton. 1967, 18p
AFOSR-67-1810
Contract AF 49 (638)-1235
Availability: Published in Learning and Individual Differences p238-52 1967.

Descriptors: (*Learning, Performance (Human)), Factor analysis, Personality, Conditioned reflex, Memory, Symposia.

Hypotheses about individual differences must be in terms of the process constructs of contemporary theories of learning, memory, and information processing performance. This generalization is supported by references to statements of others in a conference on 'Learning and Individual Differences' and illustrated by reference to the contemporary analysis of the role of coding and recording activities of human subjects in short-term memory and verbal learning tasks. The compatibility of S-R association theory and information-processing theories of human learning and performance is asserted and defended in terms of the process model of the learned association of two events. (Author)
AD-656 535 Not available from CFSTI.

EFFECT OF SIZE AND LOCATION OF INFORMATIONAL TRANSFORMS UPON SHORT-TERM RETENTION,
Michigan Univ Ann Arbor
Michael I. Posner, and Ellen Rossman. 7 Jul 64, 12p

AFOSR-67-1811
Contract AF 49 (638)-1235
Prepared in cooperation with Wisconsin Univ., Madison.
Availability: Published in Journal of Experimental Psychology v70 n5 p496-505 1965.

Descriptors: (*Retention, Performance (Human)), Memory, Experimental design, Learning.

The series of studies investigates the effect of informational transformations of various levels of difficulty, as indicated by the amount of information reduction required, upon material in short-term storage at the time of the transform. Experiment I shows that with number and similarity of interpolated items held constant, the greater the difficulty of a transform the more forgetting will result from it. Experiments II and III show that these effects cannot be attributed entirely to increases in the time an item remains in store. Rather, time in store and difficulty of transform both contribute to determining the amount of forgetting. Experiment IV shows that the loss of material in store is a decreasing function of its distance prior to the transform, but that the transformed material itself shows no decline in retention. These results point to an operational definition of rehearsal as a process requiring part of the limited central capacity of S. (Author)
AD-656 536 Not available from CFSTI.

MEMORY AND THOUGHT IN HUMAN INTELLECTUAL PERFORMANCE,
Michigan Univ Ann Arbor
Michael I. Posner. 1 Sep 64, 21p
AFOSR-67-1816
Contract AF 49 (638)-1235
Prepared in cooperation with Wisconsin Univ., Madison.
Availability: Published in Brit. J. Psychol. v56 n2/3 p197-215 1965.

Descriptors: (*Reasoning, Performance (Human)), Memory, Retention, Recall, Problem solving, Reading, Learning.

The paper reviews efforts to extend the use of information techniques to tasks which are intellectual in nature. Complex tasks such as problem solving and concept formation are viewed in terms of simpler processes of information transformations and immediate memory. The first section of the paper considers efforts to describe the difficulty of transformations such as occur in arithmetic operations and concept utilization in terms of their information parameters. The second part considers the relationship of these transformations to tasks which require retention. The final section extends the analysis to the complex sequential tasks of induction, problem solving and reading. The paper as a whole may be considered as a quantitative extension of the view of thinking as skilled performance. (Author)
AD-656 537 Not available from CFSTI.

COGNITIVE ASPECTS OF INFORMATION PROCESSING: III. SET FOR SPEED VERSUS ACCURACY,
Michigan Univ Ann Arbor Dept of Psychology
Paul M. Fitts. 6 Feb 65, 11p
AFOSR-67-1817
Contract AF 49 (638)-1235
Availability: Published in Journal of Experimental Psychology v71 n6 p849-57 1966.

Descriptors: (*Reaction (Psychology), Accuracy), Reflexes, Performance (Human), Responses, Numerical methods and procedures.

The study examines the capacity of Os to adapt to changes in the relative emphasis on speed vs. accuracy of responses. 3 matched groups of 6 Os each were trained for 3 days in a choice reaction-time (RT) task, with feedback indicating both speed and accuracy. Emphasis on speed decreased mean RT but increased errors. A control group, working without an exact payoff or immediate feedback, showed somewhat greater within- and between-S variability than did either the speed or accuracy groups and was at an intermediate level on all performance measures. Similar distributions of RTs were found for correct responses and for errors as was predicted by a sequential sampling and decision model of choice RT. RT distributions for all O's were approximately normal under a set for speed, but under accuracy instructions some O's gave highly skewed distributions. (Author)
AD-656 538 Not available from CFSTI.

EFFECTS OF ASSOCIATION VALUE ON PERCEPTUAL SEARCH,
Michigan Univ Ann Arbor
Edward E. Smith, and Howard Egeth. 29 Dec 64,
AFOSR-67-1820
Contract AF 49 (638)-1235
Availability: Published in Journal of Experimental Psychology v71 n5 p687-90 1966.

Descriptors: (*Target discrimination, Performance (Human)), Reaction (Psychology), Reflexes, Visual signals, Search theory.

The effect of association value (AV) on stimulus discriminability was investigated by using a search methodology which yields an estimate of the time required to process each item. Ss were required to locate a target nonsense syllable embedded in a column of other nonsense syllables. Sixteen search lists were prepared so that there were 4 lists for each of the 4 possible combinations of high and low AV of target and field items. The results failed to support the hypothesis that AV affects discriminability as had been concluded in an earlier study (Portnoy, Portnoy, and Salzinger, 1964), and indicated that letter-searching strategies may account for the differences in results between the 2 studies. (Author)
AD-656 539 Not available from CFSTI.

INFORMATION CAPACITY OF DISCRETE MOTOR RESPONSES UNDER DIFFERENT COGNITIVE SETS,
Michigan Univ Ann Arbor
Paul M. Fitts, and Barbara K. Radford. 6 Nov 64, 10p
AFOSR-67-1823
Contract AF 49 (638)-1235
Availability: Published in Journal of Experimental Psychology v71 n4 p475-82 1966.

Descriptors: (*Motor reactions, Performance (Human)), Accuracy, Reflexes, Reaction (Psychology).

Previous findings on the interrelation of speed, amplitude, and accuracy of movements support the conclusion that the human motor system has a relatively constant information capacity over rather wide limits. The 2 experiments here reported examine extensions of this conclusion by comparing (a) movements that are initiated at S's convenience vs. movements following a 2-choice reaction time, and (b) the effects of variations in instructions and payoffs emphasizing speed vs. accuracy. It is concluded that (a) there is little or no benefit in spending additional time in preparation for the initiation of a skilled movement; only an increase in the time actually spent in executing a movement is of value in increasing accuracy, and (b) within limits, the information capacity of the human motor system is relatively invariant under changing cognitive sets for speed vs. accuracy. (Author)
AD-656 540 Not available from CFSTI.

GRAMMATICAL FACTORS IN SENTENCE RETENTION,
Michigan Univ Ann Arbor Dept of Psychology
Edwin Martin, and Kelyn H. Roberts. 4 Jan 65, 10p
AFOSR-67-1825
Contract AF 49 (638)-1235
Availability: Published in Journal of Verbal Learning and Verbal Behavior v5 n3 p211-8 Jun 1966.

Descriptors: (*Retention, Grammars), Analysis, Phrase structure grammars, Transformational grammars, Recall.

A rationale for indexing the structural complexity of sentences was introduced and an experiment reported that demonstrated the relationship between this index and sentence retention. The proposed measure entails a phrase-structure analysis of the sentence and a counting of the grammatical commitments incurred by each word of the sentence. A word is said to be structurally embedded in a sentence to the extent that it determines the structure of those parts of the sentence that follow. In a six-trial free-learning experiment where sentence complexity and sentence kind were manipulated independently and sentence length held constant, sentences of lesser indexed complexity were recall significantly more frequently than sentences of greater complexity. The role of sentence kind was found to affect recall, but not in the systematic way predicted by the transformation-grammar model. (Author)
AD-656 541 Not available from CFSTI.

STIMULUS RECOGNITION IN AURAL PAIRED-ASSOCIATE LEARNING,
Michigan Univ Ann Arbor Dept of Psychology
Edwin Martin. 12 Jul 65, 7p
AFOSR-67-1828
Contract AF 49 (638)-1235
Availability: Published in Journal of Verbal Learning and Verbal Behavior v6 n2 p272-6 Apr 1967.

Descriptors: (*Word association, *Learning), Reaction (Psychology), Responses, Conditioned reflex, Stimulation, Perception (Psychology).

Aural paired-associates were learned by the study-test method. On test trials, the study-trials stimuli were randomly intermixed among new stimuli and the Ss, prior to responding, had to indicate whether the present stimulus was old or new. It was found that correct responding was contingent upon stimulus recognition, and that correct responding given nonrecognition of the stimulus was at the chance level. (Author)
AD-656 542 Not available from CFSTI.

THE RANSCHBURG PHENOMENON: FAILURES OF IMMEDIATE RECALL CORRELATED WITH REPETITION OF ELEMENTS WITHIN A STIMULUS,
Michigan Univ Ann Arbor
Robert G. Crowder, and Arthur W. Melton. 1965, 4p
AFOSR-67-1829
Contract AF 49 (638)-1235
Availability: Published in Journal Psychon Sci. v2 p295-6 1965.

Descriptors: (*Recall, Errors), Performance (Human), Reaction (Psychology), Memory, Interference, Word association, Learning.

Seven-consonant stimuli were recalled immediately. When the consonant in Position 2 was repeated in Position 5, 6, or 7, an increase in errors occurred at the latter position, as compared with control stimuli involving no repetition. Confirmation of the Ranschburg Phenomenon does not occur, however, when the repeated-element position are 2 and 4. Nor was there an increase error rate for elements following a repeated element. These observations support the importance of intrastimulus interference in immediate memory, but leave uncertain the associative mechanism responsible for such interference. (Author)
AD-656 543 Not available from CFSTI.

LANREZAC, JOPPRE, AND PLAN XVII,
Rand Corp Santa Monica Calif
W. A. Stewart. Jul 67, 34p Rept no. P-3637
Availability: Published in Copyrighted journal.

Descriptors: (*Perception (Psychology), *Armed forces operations), (*Decision making, *War games), (*Officer personnel, *Leadership), Strategic warfare, Tactical warfare, Terrain, Defense systems, Defense mechanisms (Psychology), West Germany, Morale.

The monograph seeks to explore the intelligence and the strategic appraisals available to these two military leaders, and the influence of doctrine and preplanning upon their analysis of the situation confronting them. Hopefully, the review of this brief though hardly minor period of military history may highlight some considerations with broad implications for strategists and commanders.
AD-656 547 Not available from CFSTI.

ACOUSTIC INTENSITY LIMENS IN THE GOLDFISH,
American Museum of Natural History New York Dept of Animal Behavior
For primary bibliographic entry see Field 6C.
AD-656 556 Not available from CFSTI.

CREATIVITY AND CYBERNETICS,
Foreign Technology Div Wright-Patterson AFB Ohio
Yu. A. Filipev. 11 May 67, 78p Rept no. FTD-MT-66-53
TT-67-62514
Edited machine trans. of mono. Tvorchestvo i Kibernetika, Moscow, 1964 79p.

Descriptors: (*Creativity, *Cybernetics), Dynamics, Feedback, Perception, Information theory.

By nature, creativity is an informational process. Any product of art appears as a result of processing by the artist (in his own consciousness) of some defined information, proceeding to him from the outside world (personal observations, reading, stories of other persons, and so forth). This book is one of the first attempts to expand to an analysis of the nature of artistic creativity the principles of cybernetics, a science concerning communications, connections and control in different complicated systems (including also in the human organism). In it are considered (in reference to the nature of artistic creativity) such ideas of cybernetics as feedback, signal, and information. Author is making an attempt to uncover the creative process in his manifold communications and mediations from the point of view of the feedback principle.
AD-656 568 HC$3.00 MF$0.65

VOICE COMMUNICATION: EFFECT OF STRESS ON TALKERS, A PERSONALITY STUDY,
Purdue Research Foundation Lafayette Ind
For primary bibliographic entry see Field 17B.
AD-656 631 HC$3.00 MF$0.65

SPECIFIC MOTOR RESPONSE DURING SLEEP TO SLEEP-ADMINISTERED MEANINGFUL SUGGESTION: AN EXPLORATORY INVESTIGATION,
Pennsylvania Hospital Philadelphia
Jeremy C. Cobb, Frederick J. Evans, Lawrence A. Gustafson, Donald N. O'Connell, and Martin T. Orne. 21 Jan 65, 11p
AFOSR-67-1853
Grant AF-AFOSR-707-65
Prepared in cooperation with Pennsylvania Univ., Philadelphia.
Availability: Published in Perceptual and Motor Skills v20 p629-36 1965.

Descriptors: (*Sleep, *Hypnosis), Electroencephalography, Behavior, Responses, Learning.

Complex meaningful suggestions were given during various stages of physiological sleep as defined by EEG monitoring to 4 Ss high and 4 Ss low in hypnotizability. All the high hypnotizability Ss gave accurate behavioral responses while remaining asleep, but none of the low hypnotizability Ss did so. Specific response to sleep-administered suggestion was obtained only during Stage 1 periods. (Author)
AD-656 647 Not available from CFSTI.

A COMPARISON OF HYPNOTIC SUSCEPTIBILITY AS ASSESSED BY DIAGNOSTIC RATINGS AND INITIAL STANDARDIZED TEST SCORES,
Pennsylvania Hospital Philadelphia
Donald N. O'Connell, Martin T. Orne, and Ronald E. Shor. 7 Jun 65, 12p
AFOSR-67-1839
Grants AF-AFOSR-707-65, PHS-MH-11028-01
Prepared in cooperation with Pennsylvania Univ., Philadelphia, and LaSalle Coll., Philadelphia, Pa.
Availability: Published in The International Journal of Clinical and Experimental Hypnosis v14 n4 p324-32 1966.

Descriptors: (*Hypnosis, Reaction (Psychology)), Predictions, Selection, Psychometrics, Correlation techniques, Reliability.

In a nonrandom sample of 63 Ss, a correlation of .79 was found between Stanford Hypnotic Susceptibility Scale, Form A (SHSS:A) of Weitzenhoffer and Hilgard (1959) scores and diagnostic ratings of hypnotizability. This degree of correlation corresponds to an index of forecasting efficiency of 36.8%. Limitations on the interpretation of this finding both as a validity coefficient and as an indicant of the predictive values of SHSS:A are discussed. (Author)
AD-656 648 Not available from CFSTI.

ON THE MECHANISMS OF POSTHYPNOTIC AMNESIA,
Pennsylvania Hospital Philadelphia Unit for Experimental Psychiatry
Martin T. Orne. 1966, 17p
AFOSR-67-1846
Contract Nonr-4731 (00), Grant AF-AFOSR-707-65
Prepared for presentation at the Society for Clinical and Experimental Hypnosis, Los Angeles, October 1965.
Availability: Published in The International Journal of Clinical and Experimental Hypnosis v14 n2 p121-34 1966.

Descriptors: (*Hypnosis, Recall), Behavior, Memory, Reaction (Psychology).

Experimental and clinical evidence about posthypnotic amnesia are reviewed. Rather than postulate any single mechanism which might account for the phenomenon, two interpretations are contrasted which seem sharply opposed. First, posthypnotic amnesia may be seen as essentially like any other hypnotically suggested experience. It can be considered as an explicitly or implicitly administered posthypnotic suggestion. On the other hand amnesia can be viewed as a form of dissociation. One possible mechanism of such dissociation may be a basic difference of the structure of thought processes involved in hypnosis compared to those of normal waking experience. In this sense amnesia should occur independently of suggestion and be different in kind from most other hypnotic phenomena. The former mechanism may occur more frequently in experimental situations and the latter in clinical contexts. (Author)
AD-656 649 Not available from CFSTI.

A COMPARISON OF AC AND DC EYE MOVEMENT RECORDING,
Pennsylvania Hospital Philadelphia Unit for Experimental Psychiatry
For primary bibliographic entry see Field 6P.
AD-656 650 Not available from CFSTI.

ACOUSTIC FACTORS VERSUS LANGUAGE FACTORS IN SHORT-TERM MEMORY,
Michigan Univ Ann Arbor Dept of Psychology
R. Conrad, P. R. Freeman, and A. J. Hull. 1965, 4p
AFOSR-67-1822
Contract AF 49 (638)-1235
Availability: Published in Psychon Sci v3 p57-8 Jul 15 1965.

Descriptors: (*Recall, *Verbal behavior), Memory, Visual signals, Learning.

Forty-five Ss recalled 6-consonant sequences immediately after letter by letter visual presentation. The main factor contributing to ease of recall was within-sequence acoustic confusability. Language habits were relatively unimportant. Single-letter language frequency was unrelated to recall; second order effects made a small but significant contribution. (Author)
AD-656 651 Not available from CFSTI.

IDENTIFICATION OF SEQUENTIAL AUDITORY AND VISUAL STIMULI,
Michigan Univ Ann Arbor Dept of Psychology
Arthur S. Kamlet. 1965, 4p
AFOSR-67-1815
Contract AF 49 (638)-1235
Availability: Published in Psychon Sci v3 p419-20 1965.

Descriptors: (*Visual perception, Performance (Human)), (*Auditory perception, Performance (Human)), Visual signals, Auditory signals, Reaction (Psychology), Psychophysics, Attention, Identification.

Two Ss identified pairs of 15 msec. one-bit auditory and visual stimuli when the interval between the stimuli varied from 0 to 500 msec. The auditory judgments were better when the auditory and visual signals were separated by 500 msec. than when the two signals were presented simultaneously, and were also better when the auditory stimulus followed the visual stimulus than when the visual stimulus was delayed. (Author)
AD-656 652 Not available from CFSTI.

RECENT PSYCHOLOGICAL RESEARCH RELEVANT TO THE HUMAN FACTORS ENGINEERING OF MAN-MACHINE SYSTEMS,
Michigan Univ Ann Arbor Dept of Psychology
For primary bibliographic entry see Field 5H.
AD-656 653 Not available from CFSTI.

A SIXTEEN-UNIT PROJECTOR WITH MICROSECOND TURN-ON TIME,
Michigan Univ Ann Arbor Dept of Psychology
For primary bibliographic entry see Field 14E.
AD-656 654 Not available from CFSTI.

S-R COMPATIBILITY AND INFORMATION REDUCTION,
Michigan Univ Ann Arbor Dept of Psychology
Paul M. Fitts, and Irving Biederman. 18 Feb 64, 7p
AFOSR-67-1830
Contract AF 49 (638)-1235
Availability: Published in Journal of Experimental Psychology v69 n4 p408-12 Apr 1965.

Descriptors: (*Reaction (Psychology), Reflexes), Motor reactions, Performance (Human), Accuracy, Perception (Psychology), Stimulation, Responses, Compatibility.

S-R compatibility effects were examined in 4 information-processing tasks (1-bit information conserving, 2-bit conserving, 2 to 1 bit filtering, and 2 to 1 bit condensing) in combination with 2 sets of responses (2 or 4 fingers of 1 hand only vs. 1 or 2 fingers of both hands). Eight different groups of 10 Ss each were used, 1 under each condition, and tested for 2 sessions. 1-bit conserving and 2 to 1 bit filtering were accomplished about equally well, under both response codes. The other 4 tasks involved significantly more time and errors. When a compatible (2-hand) response code was used, 2-bit information conserving was more efficient than 2 to 1 bit information condensing, notwithstanding the fact that the former involved twice as many alternative responses; these relations were reversed when a less compatible (1-hand) response code was used. These results indicate the importance of response coding in interpreting studies of different information-handling processes. (Author)
AD-656 655 Not available from CFSTI.

CONCEPT UTILIZATION,
Michigan Univ Ann Arbor Dept of Psychology
Edwin Martin. 1967, 45p
AFOSR-67-1831
Contract AF 49 (638)-1235
Availability: Published in Handbook of Mathematical Psychology v3 p205-47 1965.

Descriptors: (*Learning, Mathematical models), Verbal behavior, Word association, Decision making, Conditioned reflex, Reaction (Psychology), Perception (Psychology), Stimulation, Responses.

Four speculations as to what subjects do in a concept-utilization task are considered. None of these speculations is testable by direct observation. In each case, however, the speculation is formulated with sufficient precision to allow the deduction of new statements which are testable by direct observation. The several theorists involved hypothesize variously that concept utilization can by viewed as paired-associate learning, as cue conditioning, as strategy selection, and as a combination of selection and conditioning. Making comparisons among the four models, a special emphasis is detected on the utility of models which (1) make a firm contact with both the stimulus situation and response classes and (2) allow for the operation of more than one process at a time. Restle's strategy selection is poor in contact and is a single-process model, and consequently poor in verification. The two most successful models, Bourne and Restle's cue-conditioning model and Bower and Trabasso's selection-conditioning model, both make good contact and postulate multiple processes. (Author)
AD-656 656 Not available from CFSTI.

COMPORTAMENTO DELLE SINGOLE COMPONENTI DEL POTENZIALE EVOCATO VISIVO DURANTE IL SONNO NELL'UOMO (Behavior of the Single Components of the Visual Evoked Potential During Sleep in Man),
Genoa Univ (Italy) Clinica Neurochirurgica
For primary bibliographic entry see Field 6P.
AD-656 662 Not available from CFSTI.

DECISION-MAKING UNDER UNCERTAINTY AND PROBLEM SOLVING: A GESTALT THEORETICAL VIEWPOINT,
Rand Corp Santa Monica Calif
N. Jordan. 1 Dec 60, 40p Rept no. P-2156

Descriptors: (*Decision making, *Social psychology), Performance (Human), Problem solving, Decision theory, Behavior, Motivation, Fear, Anxiety, Probability, Uncertainty, Mathematical models.

Phenomena of thinking, problem-solving, and decision-making are discussed. The discussion implies that men prefer to make decisions under conditions of certainty. When confronted with the necessity to make a decision under conditions of uncertainty they will procrastinate and take many actions in an attempt to achieve certainty before making the decision. These actions are of the nature of thinking and problem solving, requesting additional information, asking the advice of experts, etc., i.e., they attempt to structure the situation to achieve certainty.
AD-656 680 HC$3.00 MF$0.65

PARALLEL VERSUS SERIAL PROCESSES IN MULTIDIMENSIONAL STIMULUS DISCRIMINATION.
Technical rept.,
Michigan Univ Ann Arbor Dept of Psychology
Howard E. Egeth. Jan 66, 45p Rept no. TR-2
AFOSR-67-1805
Contract AF 49 (638)-1235
Doctoral thesis.

Descriptors: (*Visual perception, Performance (Human)), Reflexes, Reaction (Psychology), Stimulation, Accuracy, Visual signals, Theses, Information theory.
Identifiers: Information processing (Psychology).

Although considerable effort has been devoted to the description of processes underlying discriminations along single dimensions, there have been few attempts to determine whether or how these elementary processes are combined when discrimination requires the consideration of more than one stimulus dimension. The specific question that was investigated here was whether Ss discriminate between multidimensional objects by comparing them one dimension at a time (serial mode), or by comparing them on several dimensions simultaneously (parallel mode), or by comparing unitary representations of them without regard to their component dimensions (template mode). Specific instances of these general modes of information processing were generated by the combination of some assumptions about the comparison process, and predictions from each of these models were compared with obtained data. In the present experiments, Ss were required to indicate whether two simultaneously presented multidimensional visual stimuli were identical or different. The response measure was reaction time, and Ss had a monetary incentive to respond both quickly and accurately. It was concluded that the most appropriate model for this task is one that assumes that dimensions are compared serially, and that the order in which dimensions are compared varies from trial-to-trial. Further, when a pair differs along several dimensions, Ss do not necessarily examine every dimension before initiating the response 'Different.' (Author)
AD-656 686 HC$3.00 MF$0.65

ADVANCES IN THE USE OF COMPUTERS FOR HANDLING HUMAN FACTORS TASK DATA,
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 5E.
AD-656 701 HC$3.00 MF$0.65

HUMAN PERFORMANCE IN INFORMATION PROCESSING AND STORAGE.
Final rept.,
Michigan Univ Ann Arbor Dept of Psychology
Arthur W. Melton. Jul 67, 72p Rept no. 05823-41-F
AFOSR-67-1874
Contract AF 49 (638)-1235, ARPA Order-461

Descriptors: (*Human engineering, *Man-machine systems), Information theory, Stimulation, Performance (Human), Reaction (Psychology), Reflexes, Attention, Sensory perception, Memory, Central nervous system, Responses, Information retrieval, Recall, Research program administration.
Identifiers: Information processing (Psychology).

Research was conducted in the general field of Engineering Psychology, and specifically on human performance. This research is designed to produce a taxonomy of human information-processing functions, to determine human capabilities and limitations in fulfilling basic information-processing functions, to develop a model of human short-term memory in the interest of advancing basic knowledge of human information processes.
AD-656 709 HC$3.00 MF$0.65

SHORT-TERM RECOGNITION MEMORY.
Memorandum rept. no. 2,
Michigan Univ Ann Arbor Dept of Psychology
Arthur W. Melton, Arnold Sameroff, and Errol D. Schubot. May 67, 18p
AFOSR-67-1803
Contracts AF 49 (638)-1236, DA-36-039-sc-78801
Presented at the Annual Meeting of the Psychonomic Society (4th), Bryn Mawr College, August 31, 1963.

Descriptors: (*Memory, Performance (Human)), Recall, Experimental design, Accuracy, Stimulation, Learning, Retention, Information theory, Reaction (Psychology).
Identifiers: Information processing (Psychology).

The rapid build-up of false-positives in the continuous short-term recognition experiment and almost zero-slope function thereafter suggests that this index of practice inhibition, or of diffusion and exchange of elements between traces, may be a powerful yet simple tool for the analysis of similarity relations among stimuli, and for the generation of predictions about stimulus discriminability factors in associative learning. The better recognition memory for stimuli originally called 'old' even though they were actually 'new' seems to be a phenomenon of widespread occurrence and one that is not dependent in any way on the failure of the S to know that his original judgment of the stimulus as old was in fact incorrect. Experiments are now in progress in which the S not only makes the judgment of 'old' or 'new' but also indicates his confidence in his judgment. If, from these studies, it is found that false-positives--calling a new stimulus 'old'--which the S says were mere guesses, follow the short-term forgetting function of the 'new'-'old' while those new stimuli that he calls 'old' with confidence follow the forgetting function of the 'old'-'old,' then these different slopes will be accepted as an index of the summation of generalized habit strength and specific habit strength resulting from explicit occurrence of the specific event. This will serve as another useful tool in the understanding of the effects of repetition in learning and memory. (Author)
AD-656 710 HC$3.00 MF$0.65

EFFECTS OF S-R CODING ON THE RATE OF GAIN OF INFORMATION.
Technical rept.,
Michigan Univ Ann Arbor Dept of Physiology
James R. Peterson. Dec 65, 39p Rept no. 05823-8-T
AFOSR-67-1807
Contract AF 49 (638)-1235
Doctoral thesis.

Descriptors: (*Reaction (Psychology), Reflexes), Information theory, Symbols, Responses, Stimulation, Coding, Performance (Human), Theses.
Identifiers: Information processing (Psychology).

Since the publication of Hick's 'On the Rate of Gain of Information' in 1952, it has generally been held that the function relating reaction time (RT) and the amount-of-information-transmitted-per-response (H sub t) was a linear one. As a linear function, it could be expressed in the slope-intercept form: RT = a + bH sub t where a and b are the intercept and the slope constants. From the results of experimentation conducted subsequent to Hick's (1952) publication, it appears likely that

the magnitudes of the slope and intercept constants are dependent upon factors inherent in the experimental situation but that a and b are not affected in the same way. The purpose of the experiments reported here was to examine the probable validity of three hypotheses: (1) The RT vs. H sub t relationship is linear; (2) The intercept constant, a, is unaffected by variations in S-R coding rules; and (3) The slope constant, b, is highly dependent upon variations in S-R coding rules. The results of the present experiment are: (1) The RT vs. H sub t relationships were found to depart significantly from linearity for several of the S-R coding schemes studied; (2) The intercept constant, a, was found to be relatively insensitive to the S-R coding rules which were used; and (3) The slope constant, b, was found to be greatly affected by the S-R coding rules which were used. (Author)
AD-656 711 HC$3.00 MF$0.65

HUMAN PERFORMANCE IN CONTINGENT INFORMATION PROCESSING TASKS.
Technical rept.,
Michigan Univ Ann Arbor Dept of Psychology
Irving Biederman. Oct 66, 110p Rept no. TR-3
AFOSR-67-1801
Contract AF 49 (638)-1235
Doctoral thesis.

Descriptors: (*Reaction (Psychology), Reflexes), Information theory, Decision making, Performance (Human), Responses, Visual signals, Stimulation, Behavior, Theses.
Identifiers: Information processing (Psychology).

Theoretical accounts of complex human information processing behavior have emphasized the utilization of contingencies whereby the processing of some information directs the processing requirements of the remaining sources of uncertainty. The manner in which such contingencies are processed, however, has received little empirical study. The present investigation examined the effects of discriminability and S-R compatibility on the speed and accuracy of response in tasks in which the relevancy of a given stimulus dimension was contingent upon the value of the stimulus on some other dimension. It was concluded that contingencies are utilized by the subject to select dimensions to process. Further, these contingencies are utilized at some stage prior to that involved in the selection of responses. RTs to a repeated stimulus were faster than RTs to a different stimulus. The magnitude of these repetition effects varied as a function of the discriminability of the dimension that changed value, its relevancy , and its structural status. (Author)
AD-656 712 HC$3.00 MF$0.65

CHOICE REACTION TIME: AN ANALYSIS OF THE MAJOR THEORETICAL POSITIONS.
Technical rept.,
Michigan Univ Ann Arbor Dept of Psychology
Edward E. Smith. Jan 67, 90p Rept no. TR-6, 05823-13-T
AFOSR-67-1804
Contract AF 49 (638)-1235

Descriptors: (*Reaction (Psychology), Reflexes), Stimulation, Responses, Compatibility, Accuracy, Decision making, Behavior, Performance (Human), Reviews.

The report analyzes and evaluates (against experimental findings) contemporary theories of choice reaction time (CRT). The influence of Donders' subtraction method on current theory is assessed, followed by a review of experimental findings concerned with the effects on CRT of: (1) number of alternatives, (2) stimulus probability, (3) stimulus value, (4) repetition of stimulus or response, (5) stimulus discriminability, (6) stimulus-response compatibility, (7) practice, and (8) emphasis on speed versus accuracy. A three-state conceptualization of the central mechanisms operative during the latent period--stimulus preprocessing, stimulus categorization, and response selection--is proposed. The theories are dichotomized on the basis of the process-template matching versus feature testing--which is assumed to underlie stimulus categorization. The analysis indicates that current theories have neglected response selection processes and are consequently unable to account for several experimental findings. A final section deals with the relation of CRT theories to perceptual recognition theories. (Author)
AD-656 713 HC$3.00 MF$0.65

COGNITIVE FACTORS IN INFORMATION PROCESSING.
Memorandum rept.,
Michigan Univ Ann Arbor Dept of Psychology
Paul M. Fitts. Feb 67, 32p Rept no. MR-1
AFOSR-67-1802
Contract AF 49 (638)-1235

Descriptors: (*Reaction (Psychology), Reflexes), Performance (Human), Learning, Behavior, Information theory, Data processing systems, Visual signals, Responses, Accuracy.
Identifiers: Information processing (Psychology).

The general framework proposed to use in interpreting human information-processing behavior is that of a program for processing data. The term program as used in this report has essentially the same meaning, and is presumed to serve a similar function, as does the program which governs an electronic data-processing system or any organization of people engaged in a complex task or production. Reference to the analogy between human functions and a stored-program computer, as various writers have emphasized, permits us to talk about alternative processes or procedures for operating on data in complex ways, independently of the particular data on which these operations are performed or the particular system that is processing the data. (Author)
AD-656 714 HC$3.00 MF$0.65

THE EFFECTS OF FAMILIARITY ON THE PERCEPTUAL RECOGNITION AND CATEGORIZATION OF VERBAL INFORMATION.
Technical rept.,
Michigan Univ Ann Arbor Dept of Physiology
Edward Smith. Dec 65, 79p Rept no. 05823-9-T
AFOSR-67-1806
Contract AF 49 (638)-1235, ARPA Order-461

Descriptors: (*Memory, Performance (Human)), Stimulation, Recall, Information retrieval, Perception (Psychology), Classification, Reaction (Psychology), Reflexes, Word association, Learning, Information theory.
Identifiers: Information processing (Psychology).

The effects of stimulus familiarity on the processing of stimulus and memorial information were investigated in two tasks: one which supposedly required only the perceptual recognition of each stimulus word (E task), and one which required a meaningful categorization of each stimulus word (C task). A comparison of the data for the two tasks and a consideration of the slopes of the RT functions obtained in the E task indicated that these functions reflected a memory process that follows recognition, rather than the recognition process itself. It was this memory process, rather than recognition, which seemed to be sensitive to familiarity. In the C task it appeared that familiarity affected both the retrieval and testing of the stored information about the meanings of the stimulus words. (Author)
AD-656 715 HC$3.00 MF$0.65

SOME MOTIVATIONAL DETERMINANTS OF RACIAL DIFFERENCES IN INTELLECTUAL ACHIEVEMENT.
Technical rept.,
Michigan Univ Ann Arbor
Irwin Katz. Jan 67, 24p Rept no. TR-1
Contract N00014-67-A-0181-0004
Availability: Published in International Journal of Psychology.

Descriptors: (*Social psychology, Motivation), Behavior, Performance (Human), Perception (Psychology), Education, Students.
Identifiers: Negroes.

A number of motivational concepts have been proposed in recent years that are relevant to the problem of racial differences in intellectual achievement in the United States. Atkinson's theoretical model of achievement motivation suggests that for Negroes in predominantly white intellectual-academic situations, the value of success is high while the expectancy of success is low, because white achievement standards are higher than Negro standards. Crandall's distinction between internal and external sources of achievement value and achievement standards, and the research of Crandall and others on the role of maternal approval in the early emergence of achieving behaviors, have implications for the study of class and race differences in the development of intellectual motivation. The low performance of Negro pupils appears to be associated with inadequate reinforcement histories both at home and in the classroom. Early deprivation of approval seems to establish self-perpetuating patterns of overdependence upon the social environment for achievement rewards and the setting of achievement standards. Another investigator, Rotter, has studied group and individual differences in the tendency to perceive one's rewards as internally or externally controlled. Negro children and adults display less sense of internal control. The foregoing concepts can be unified and used to account substantially for available data on the achievement of Negro pupils in racially segregated and integrated public schools. (Author)
AD-656 723 Not available from CFSTI.

THE SOCIALIZATION OF ACADEMIC MOTIVATION IN MINORITY GROUP CHILDREN.
Michigan Univ Ann Arbor
For primary bibliographic entry see Field 51.
AD-656 724 Not available from CFSTI.

INNOVATION IN TASK ORIENTED COMMUNICATION.
Final rept.,
Tufts Univ Medford Mass Inst for Psychological Research
Thornton B. Roby. 1967, 6p
AFOSR-67-1868
Grant AF-AFOSR-1095-66

Descriptors: (*Memory, Performance (Human)), (*Verbal behavior, Learning), Reaction (Psychology), Reflexes, Decision making, Information theory, Recall, Information retrieval, Attention, Perception (Psychology), Reviews.
Identifiers: Information processing (Psychology).

The report reviews research carried out on human performance in information processing and memory. Experimental results and theoretic inferences are presented on the following topics: Taxonomy of human information handling; Selective information handling (including the topics of Selective attention and perception, and Performance factors); Information storage and retrieval (including Characteristics of the message, Time and events preceding retrieval, Events preceding storage, Recognition memory, and Theoretic issues). (Author)
AD-656 776 HC$3.00 MF$0.65

CONSERVATIVE INFERENCE WITH SIMPLE AND DIFFUSE HYPOTHESES.
Final rept.,
Michigan Univ Ann Arbor Inst of Science and Technology

Ward Edwards. Aug 67, 9p Rept no. 08024-7-F
AFOSR-67-1877
Contract AF 49 (638)-1731

Descriptors: (*Decision making, Performance (Human)), Information theory, Sampling, Probability, Mathematical models, Statistical analysis, Correlation techniques, Reviews.
Identifiers: Information processing (Psychology).

A large number of experiments have evaluated the manner in which men make inferences about hypotheses on the basis of fallible data. The most important conclusion of these experiments is that man is a conservative information processor, unable to extract as much information as is latent in the data. The research reported further investigates the phenomena of conservative information processing. (Author)
AD-656 781 HC$3.00 MF$0.65

CORRELATES OF AMBIVALENCE, RISK-TAKING AND RIGIDITY FINAL SCIENTIFIC REPORT.
Hebrew Univ., Jerusalem (Israel). Dept. of Psychology.
A. Minkowich. 1 Mar 67, 433p AFOSR-67-1157, REPT.-3
Contract AF-EOAR-32-65

Descriptors: *Attitude, *Emotional factor, *Perception, *Personality, *Psychological effect, Anxiety, Behavior, Effect, Emotion, Factor, Human, Performance, Psychometrics, Reaction, Sociology, Stress (biol).

For abstract, see STAR 05 18.
N67-32671 HC$3.00 MF$0.65

RESTORATION OF YOUTH THROUGH TRAINING.
Wakoff Research Center, Staten Island, N. Y.
For primary bibliographic entry see Field 5K.
PB-175 609 HC$3.00 MF$0.65

5K. Sociology

AREA HANDBOOK FOR SOUTH VIETNAM,
American Univ Washington D C Foreign Area Studies Div
Harvey H. Smith, Donald W. Bernier, Frederica M. Bunge, Frances Chadwick Rintz, and Rinn-Sup Shinn. Apr 67, 518p
DA-PAM-550-55
Availability: Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402 $1.75.

Descriptors: (*Vietnam, Handbooks), Sociology, Political science, Economics, Armed forces (Foreign), Culture.

Contents: General character of the society; Physical environment; Historical setting; Population; Ethnic groups and languages; Social structure; Family; Living conditions; Education; Artistic and intellectual expression; Religion; Social values; Governmental system; Political dynamics; Foreign relations; Public information; Political values and attitudes; Character and structure of the economy; Agriculture; Industry; Labor; Domestic trade; Foreign economic relations; Public finance; Banking and currency; Public order and safety; The Armed Forces.
AD-655 851 MF$0.65

SOCIAL STRUCTURE AND SHIFTING AGRICULTURE OF THE WHITE MEO.
Technical rept. no. 2, Nov 65-Mar 67,
Wildlife Management Inst Washington D C
George A. Binney. 1967, 39p
Contract N00014-66-C-0143, ARPA Order-811
See also AD-640 713.

Descriptors: (*Anthropology, *Thailand), Sociology, Culture, Agriculture, Ecology, Environment.

The report comprises eight sections. The first concerns itself with introductory remarks by various writers on shifting cultivation as practiced by the Meo; the second reviews yields per household in the White Meo communities of Mae Nai and Ban Khae in northern Thailand and describes some ecological considerations of shifting cultivation in those communities. Climatic, edaphic, and biotic environmental distinctions are noted. The later sections deal with site selection, cutting, burning, cropping (harvesting), and fallowing in the local agricultural pattern. Swidden farming follows a locally determined, well-defined pattern. Primary forest land is preferred because of superior soils and the requirements of rice cultivation, even though secondary forests are less difficult to clear. Techniques of cultivation differ from area to area and often from village to village. Swiddens often are planted to a number of crops. Intercropping is primarily in corn-opium swiddens. There is an overlapping of plantings and harvests in many swiddens which lasts until the swidden is fallowed. Intercropping and the succession of crops, especially alternation of wet season cereals and dry season opium and legumes, amounts to crop rotation on a limited scale. Swidden farming requires more labor than permanent wet rice cultivation. (Author)
AD-655 931 HC$3.00 MF$0.65

REALISM IN LABORATORY SIMULATION: MYTH OR METHOD,
Ohio State Univ Columbus
J. Eugene Haas, and Thomas E. Drabek. 1967, 13p
AFOSR-67-1726
Grant AF-AFOSR-572-65
Prepared in cooperation with Denver Univ., Colo.
Availability: Published in Social Forces v45 n3 p337-46 Mar 1967.

Descriptors: (*Organizations, Simulation), (*Programming (Computers), Laboratories), Social sciences, Professional personnel, Sociology, Leadership, Group dynamics, Behavior, Synthesis.

By asking the question 'What is it that makes an experiment 'realistic'' we seek to recast previous discussion focused on 'realism versus artificiality.' It is suggested that relationships between variables may vary under different experimental conditions. The degree of realism is used as a means of identifying experimental characteristics. This analysis of the concept of realism provides a meaningful alternative for future synthesis of small group research, both field and laboratory. Characteristics of a research method labeled 'realistic simulation' are also identified.
AD-656 017 Not available from CFSTI.

IMPACT OF MODERNIZATION IN THE PHILIPPINES.
Technical rept. no. 1, 1 Jul-31 Dec 66,
Pennsylvania State Univ University Park
George M. Guthrie, and Frank Lynch. Jan 67, 142p
Contract Nonr-656 (37), ARPA Order-855
Prepared in cooperation with Ateneo de Manila (Republic of the Philippines).

Descriptors: (*Anthropology, *Philippines), Sociology, Urban areas, Linguistics, Culture, Social communication, Social psychology, Diseases, Law, Behavior, Economics.
Identifiers: Psycholinguistics.

Three projects are reported on. Project One, a study of thought categories among Tagalog mother-tongue speakers in and near Manila, draws heavily on the anthropological specialization known as ethnoscience. In the period under review techniques were devised for eliciting responses in the cognitive domains of disease and kinship, and preliminary findings were made. Project Two, a study of conflicting legal concepts in a changing society, reached some understanding of how traditional Tagalog norms for the use of space differ from modern Philippine law on the question. Project Three studies a booming fishing town in central Philippines. The report describes this town and suggests how the nature of the changes occurring there may be clarified and explained. (Author)
AD-656 122 HC$3.00 MF$0.65

THEORIES OF SOCIAL CHANGE AND THE ANALYSIS OF NUCLEAR ATTACK AND RECOVERY,
Human Sciences Research Inc Mclean Va
Neil J. Smelser. Jan 67, 190p Rept no. HSR-RR-67/1-Me
Prepared in cooperation with California Univ., Berkeley, and Stanford Research Inst., Calif.

Descriptors: (*Sociology, *Nuclear warfare), Vulnerability, Disasters, Recovery, Civil defense systems, Countermeasures, Social sciences, Culture.
Identifiers: Post-attack.

Several different theoretical orientations toward the analysis of social change are presented in order to examine the kinds of social change processes which might be created by nuclear attack. To gain intellectual leverage on the problems of understanding the social effects of attack and the ways in which these attack effects could lead toward institutional decline or institutional recovery, these possible effects and patterns are viewed as unusual special cases of the larger analytic problem of formulating general theories of social change. Thus, the monograph is both a general exploration of the power of existing theories and models of social change and a particular application of social change theories and models to problems of defining and projecting social effects of nuclear attack.
AD-656 628 HC$3.00 MF$0.65

PROSPECTS OF TECHNOLOGICAL PROGRESS,
Rand Corp Santa Monica Calif
Olaf Helmer. Aug 67, 15p Rept no. P-3643
Prepared for presentation at a Conference of the Japan Economic Research Council in Tokyo, September, 1967.

Descriptors: (*Scientific research, Predictions), Sociology, Problem solving, Decision making, Management planning.

The paper discusses the potential progress of social technology that lies within the grasp of the next generation. These new methods will find their application within the societies of the advanced nations. It is hoped that international relations will not remain unaffected by such progress, so that some of us may live to see the beginning of the era when the ample resources of the world will be equitably distributed among all nations, and war will be obsolescent. (Author)
AD-656 697 HC$3.00 MF$0.65

THE SOCIALIZATION OF ACADEMIC MOTIVATION IN MINORITY GROUP CHILDREN.
Michigan Univ Ann Arbor
For primary bibliographic entry see Field 5I.
AD-656 724 Not available from CFSTI.

THE SPRINGFIELD ARMORY PROJECT.
Realty Research and Consulting Corp., Pittsburgh, Pa.
For primary bibliographic entry see Field 5C.
PB-174 944 HC$3.00 MF$0.65

RESTORATION OF YOUTH THROUGH TRAINING.

Final rept.,
Wakoff Research Center, Staten Island, N. Y.
Clyde E. Sullivan, and Wallace Mendell. Apr 67, 410p
Contract MDTA-18-64
Prepared for U. S. Department of Labor, Washington, D. C.

Descriptors: (*Criminology, Adolescents), (*Employment, Adolescents), (*Adolescents, *Rehabilitation), Sociology, Social psychology, Motivation, Attitudes, Education, Manpower, Prisoners, Behavior, Labor, Males, Tables, Psychometrics, Statistical analysis, Adjustment (Psychology), Addiction, Training.

The results are presented of a study of the effectiveness of a program of education and training in the operation of automatic data processing machines for selected young men in the New York City Jail on Rikers Island. The youths also received counseling, help in finding jobs (including a bond if necessary), loans to tide them over, and access to an umbrella of supporting social services. The effects of the program were measured by comparing the experience of the trainees after their release with the experience of a matched group of 'controls' who followed ordinary jail routine.
PB-175 609 HC$3.00 MF$0.65

6. BIOLOGICAL AND MEDICAL SCIENCES

6A. Biochemistry

ERYTHROCYTE PRESERVATION AND METABOLISM.
Progress rept. for 1 Apr 61,
Washington Univ., Seattle.
Ernest R. Simon, and Clement A. Finch. 1 Apr 61, 18p
Contract DA-49-007-MD-508

Descriptors: (*Erythrocytes, Preservation), Storage, Blood transfusions, Viability, Adenine, Nucleosides, Purines, Glycolysis, Metabolism, Biochemistry, Blood.

Measurements of red cell preservation were studied. The method for determining post-transfusion viability was improved and detailed measurements of aerobic and anaerobic glycolysis were devised, standardized and then correlated with viability.
AD-255 166 HC$3.00

THE DETERMINATION OF BETA-1,3-GLUCANASE: ANOMALOUS REDUCTION OF ALKALINE 3,5-DINITROSALICYLATE,
National Research Council of Canada Saskatoon (Saskatchewan) Prairie Regional Lab
D. E. Eveleigh. 28 Nov 66, 3p
NRC-9427
Availability: Published in Canadian Journal of Microbiology v13 p727-9 1967.

Descriptors: (*Hydrolases, Chemical analysis), (*Salicylates, Reduction (Chemistry)), Chemical indicators, Enzymes, Substrates, Polysaccharides, Hydrolysis, Canada.
Identifiers: Dinitro salicylic acids, Glucanases, Laminaran.

Beta-1,3 (4)-Glucan glucanohydrolase (endo-splitting glucanase) activity may be assayed by the measurement of the release of reducing groups under standard conditions. A comparison of the methods used for determining reducing power has shown that abnormally high values are obtained when 3,5-dinitrosalicylate reagent (DNS) was used in the presence of a laminaran substrate. A comparison of these methods is presented as they apply to the exo-splitting enzyme (beta-1,3-glucan glucanohydrolase, EC 3.2.1.39) and endo-splitting enzyme (beta-1,3 (4)-glucan glucanohydrolase, EC 3.2.1.6). (Author)
AD-655 869 Not available from CFSTI.

THE BIOSYNTHESIS OF THE OXYGENATED MONOTERPENES IN MINT,
National Research Council of Canada Saskatoon (Saskatchewan) Prairie Regional Lab
F. W. Hefendehl, E. W. Underhill, and E. von Rudloff. 26 Oct 66, 13p
NRC-9479
Availability: Published in Phytochemistry v6 p823-35 1967.

Descriptors: (*Plants (Botany), Metabolism), (*Terpenes, Biosynthesis), Tracer studies, Photosynthesis, Ketones, Alcohols, Furans, Plant tissue, Chromatographic analysis, Canada.
Identifiers: Mentha, Terpenols, Terpenones.

Radioactive acetate and mevalonate were found to be incorporated into the volatile oil of Mentha piperita L. var. Mitcham and M. arvensis L. var. glabrata Ray. 14C-Labelled acetate, mevalonate and CO2 were fed under light and dark conditions and the results indicate that acetate and mevalonate are incorporated per se and not via prior degradation to CO2. Acetate-1- and 2-14C and mevalonate-2-14C were incorporated into the oil more slowly than 14CO2 in the light; all terpenes studied including menthol and menthofuran showed radioactivity within 5 min of feeding 14CO2. Isolation of individual monoterpenes by GLC and determination of their specific activities upon feeding 14CO2 for various periods of metabolism confirmed Reitsema's biosynthetic sequences (piperitenone to piperitone to menthone to menthol; piperitenone to pulegone to menthone and menthofuran) in its major aspects, but it could not be confirmed that piperitenone is the first isolable precursor of these two sequences. Also, isomenthone (which was not considered previously) was found to play a major role, and evidence suggesting the sequence: an unknown precursor to isomenthone to menthone to menthol was obtained. (Author)
AD-655 872 Not available from CFSTI.

A TWO-SEGMENT COLUMN PROCEDURE FOR SINGLE STEP ISOLATION OF DEXTRAN FROM RED CELL SUSPENSIONS,
Uppsala Univ (Sweden) Inst of Physiology and Medical Biophysics
N. V. B. Marsden, and S. G. Oestling. 14 Mar 67, 16p
AFOSR-67-1683
Grant AF-EOAR-33-64
Availability: Published in Arkiv fuer Kemi v26 n43 p507-19 1967.

Descriptors: (*Dextran, Separation), Erythrocytes, Chemical analysis, Hemolysis, Ion exchange, Gels, Hemoglobin, Proteins, Collecting methods.

The paper describes a procedure for the isolation of dextran, or other neutral polymers, in red cell suspensions from other substances which interfere with their determination. The method was designed for experiments on polymer uptake by red cells suspended in solutions of varying ionic composition containing a neutral polymer and glucose, or other sugars. Dextran is determined by an anthrone method in which the main sources of interference are hemoglobin, sugars and some anions. Gel filtration through a neutral 'molecular sieve' gel makes possible the separation of the macromolecular neutral polymer from smaller molecules and ions, but the neutral polymer cannot be separated from the cellular proteins in this way. It is therefore necessary to use another method such as protein precipitation or adsorption by an ion-exchanger. The method adopted is to elute a lysed red cell suspension through a column consisting of two segments. The upper segment, which is about ten per cent of the total bed height consists of an ion-exchange dextran gel which adsorbs the hemoglobin and other cellular counter-ions and allows unadsorbed ions and neutral molecules including dextran and glucose to pass through into the longer lower segment of neutral gel, which in turn separates dextran from other components originally present in the hemolysate. In this way it is possible to isolate the dextran in a single-step procedure and to collect it in a single eluate sample. (Author)
AD-655 884 Not available from CFSTI.

STUDIES ON THE QUANTUM YIELDS OF THE PHOTODISSOCIATION OF CARBON MONOXIDE FROM HEMOGLOBIN AND MYOGLOBIN,
Rome Univ (Italy) Istituto Di Chimica Biologica
Robert W. Noble, Maurizio Brunori, Jeffries Wyman, and Eraldo Antonini. 7 Nov 66, 10p
AFOSR-67-1691
Grant AF-EOAR-22-66
Research supported in part by NSF and PHS.
Availability: Published in Biochemistry v6 n4 p1216-22 Apr 1967.

Descriptors: (*Hemoglobin, Dissociation), (*Carbon monoxide, Photochemistry), Complex compounds, Concentration (Chemistry), Molecular structure, Molecular association, Italy.
Identifiers: Myoglobin, Quantum yield.

The photodissociation of carbon monoxide from normal and modified myoglobin, hemoglobin subunits, and hemoglobin was studied. The quantum yield of this process was found to be dependent, even for monomeric proteins, on ionic strength, protein concentration, and primary structure. It was not possible to establish definitely whether or not protein aggregation state can influence quantum yield. (Author)
AD-655 885 Not available from CFSTI.

BIOCHEMICAL STUDIES OF NEURONS AND GLIA DURING LEARNING AND DIFFERENT FUNCTIONAL CONDITIONS.
Final scientific rept.,
Goteborg Univ (Sweden) Inst of Neurobiology
H. Hyden. 11 May 67, 7p
AFOSR-67-1690
Grant AF-EOAR-8-66

Descriptors: (*Learning, *Nerve cells), Nucleoproteins, Microanalysis, Electrophoresis, Labeled substances, Ribonucleic acids, Enzymes, Biosynthesis, Regeneration, Biochemistry, Sweden.

The studies represent a study of chemical basis for learning and memory. Mental processes are not easily amenable to experimental attack and any chemical approach is even more difficult. By ultramicro techniques, it was shown that nucleoprotein production is linked with neuronal functions. Studies of the incorporation of radioactively labelled precursors into the nerve cells of the second vestibular neuron during the course of the learning process were made. Another series of analyses was made in rats subjected to vestibular stimulation to increase the neuronal function. (Author)
AD-656 138 HC$3.00 MF$0.65

DETERMINATION OF ETHYLENE OXIDE IN STERILIZED CATHETERS BY GAS-LIQUID CHROMATOGRAPHY,
Walter Reed Army Medical Center Washington D C
Duane Bartak, and R. K. Kulharni. Jun 67, 13p
Rept no. TR-6704

Descriptors: (*Ethylene oxide, Gas chromatography), Sterilization, Medical equipment, Cannulation, Chemical analysis.
Identifiers: Catheters.

A rapid and reliable method of estimation of residual ethylene oxide in the rubber catheters, steril-

ized by ethylene oxide, was developed, based on gas chromatography. The ethylene oxide is extracted from the catheters by distilled water. (Author)
AD-656 213 HC$3.00 MF$0.65

TRANSLATIONAL VARIATIONS IN THE AMINO ACID SEQUENCE OF THE ALPHA-CHAIN OF RABBIT HEMOGLOBIN,
Johns Hopkins Univ Baltimore Md Dept of Biophysics
For primary bibliographic entry see Field 6C.
AD-656 222 Not available from CFSTI.

DETERMINATION OF AVAILABLE CARBOHYDRATES IN PLANT AND ANIMAL FOODS,
Colorado Univ Boulder Dept of Chemistry
For primary bibliographic entry see Field 6H.
AD-656 351 Not available from CFSTI.

RADIATION-PRODUCED AGGREGATION AND INACTIVATION IN EGG WHITE LYSOZYME,
Army Medical Research and Nutrition Lab Denver Colo
C. O. Stevens, H. E. Sauberlich, and Glenn R. Bergstrom. 26 Sep 66, 7p
Presented at the Annual Meeting of the American Society of Biological Chemistry, Atlantic City, N. J., April 1966.
Availability: Published in Journal of Biological Chemistry v242 n8 p1821-6 1967.

Descriptors: (*Muramidase, Radiation effects), Coagulation, Enzymes, Radiation chemistry, Photolysis, Molecular association, Amino acids.
Identifiers: Denaturation.

Chromatographically homogeneous egg white lysozyme has been subjected under reduced pressure to 0.67-m.e.v. gamma-rays. At 37% destruction of enzymic activity, three inactive aggregates and one partially active fraction have been isolated by salt precipitation and chromatographic procedures. The aggregates, upon reduction with 2-mercaptoethanol and reaction with iodoacetic acid, give derivatives with molecular weights of 12,000 to 15,750 in comparison with one of 14,500 for reduced carboxymethylated lysozyme. One urea-insoluble aggregate becomes soluble upon reduction and, after air oxidation, in dilute solution gives active enzyme in 15% yield. Mixed disulfides of cystine and this or other inactive fractions also give significant (10 to 20%) yields of active enzyme upon incubation with cysteine. Disulfide analyses showed close to the expected number of disulfide bonds in two of the mixed disulfide derivatives if one assumes no fragmentation but simply aggregation of lysozyme monomer molecules. Amino acid and disulfide content of the active component from reactivation of one mixed disulfide derivative agreed well with that found for the active component from reactivation of the mixed disulfide of native lysozyme. Thus a significant portion (15 to 20%) of radiation inactivation in solid lysozyme can be explained by the rupture of disulfide bonds followed by formation of 'incorrect' intermolecular disulfide bonds. (Author)
AD-656 359 Not available from CFSTI.

BIOCHEMICAL ALTERATIONS IN THIAMINE DEFICIENCY -- THEIR INTERPRETATION,
Army Medical Research and Nutrition Lab Denver Colo
For primary bibliographic entry see Field 6P.
AD-656 360 Not available from CFSTI.

FASTING PLASMA AMINO ACIDS AND NITROGEN RETENTION IN MAN FOLLOWING PROLONGED SUPPLEMENTATION WITH WHEAT GLUTEN OR EGG WHITES,
Army Medical Research and Nutrition Lab Denver Colo
For primary bibliographic entry see Field 6P.
AD-656 361 Not available from CFSTI.

STUDIES OF MEMORY TRANSFER IN RATS.
Cornell Univ Ithaca N Y Section of Neurobiology and Behavior
For primary bibliographic entry see Field 5J.
AD-656 488 HC$3.00 MF$0.65

STUDIES ON MAMMALIAN AND HUMAN PYRUVATE AND ALPHA-KETOGLUTARATE DEHYDROGENATION COMPLEXES.
Final rept. 15 Mar-14 Mar 67,
Nagasaki Univ (Japan) Atomic Disease Inst
Masahiko Koike. Mar 67, 26p
ARDG (FE)-J-232-4
Contract DA-92-557-FEC-37961

Descriptors: (*Pyruvates, *Oxidoreductases), Glutaric acids, Enzymes, Coenzymes, Nucleotides, Molecular weight, Enzyme inhibitors, Separation, Transferases, Electrophoresis, Immune serums, Japan.

Enzyme systems that catalyze a coenzyme A- and nicotinamide adenine dinucleotide-linked oxidative decarboxylation of pyruvate and alpha-ketoglutarate have been isolated from pig heart muscle as highly organized multienzyme complexes with molecular weights of 9 million and 2.7 million, respectively. On the oxidative decarboxylation of alpha-keto acids in pig heart complexes, Ca (2+) was strongly stimulatory to the same or more extent than Mg (2+). The pig heart pyruvate dehydrogenase complex was strongly inhibited by EDTA at low concentration, but the pig heart alpha-ketoglutarate dehydrogenase complex was little inhibited. The pig heart pyruvate dehydrogenase complex that catalyzes a multistage oxidative decarboxylation of pyruvate consisting successively of decarboxylation, acetyl generation, acetyl transfer and electron transfer was separated into lipoamide dehydrogenase and colorless fraction by the fractionation on a calcium phosphate gel-cellulose column in the presence of 4 M urea. An attempt was made to prepare rabbit anti-sera against a highly purified free lipoamide dehydrogenase from pig heart acid-precipitated particle. On the Ouchterlony double diffusion test and the titration studies of the several enzymatic activities with the immune globulin, immunochemical identity among three lipoamide dehydrogenase, free enzyme and other two enzymes from pyruvate and 2-oxoglutarate dehydrogenase complexes, was confirmed. (Author)
AD-656 528 HC$3.00 MF$0.65

BIOCHEMICAL STUDIES ON THE TOXIC NATURE OF SNAKE VENOM.
Kaohsiung Medical Coll (Taiwan) Dept of Biochemistry
For primary bibliographic entry see Field 6T.
AD-656 531 HC$3.00 MF$0.65

EXTRACELLULAR POLYSACCHARIDES OF YEAST,
National Research Council of Canada Saskatoon (Saskatchewan) Prairie Regional Lab
J. F. T. Spencer, and P. A. J. Gorin. 1967, 8p
Symposium on Yeast Protoplasts, Jena, 21-24 September 1965.
Availability: Published in Abhandlungen der Deutschen Akademie der Wissenschaften zu Berlin n6 p105-11 Jan 1966.

Descriptors: (*Yeasts, *Polysaccharides), Cell wall, Culture media, Chemical analysis, Starches, Growth, Canada.

Extracellular polysaccharides are produced by a number of yeast species. Phosphomannans are produced by certain Hansenula and Pichia species, mannans by Saccharomyces, Rhodotorula and Sporobolomyces species, and amylose and a heteropolymer by Cryptococcus spp. Recently phosphogalactan has been reported as a product of some Sporobolomyces sp. The mannan produced by various Rhodotorula and Sporobolomyces spp. is an alternately beta-1,3, beta-1,4-linked polymer which differs greatly from the mannans formed by Saccharomyces rouxii or S. cerevisiae, and which has no counterpart in the closely related Cryptococcus spp. Except in the case of Saccharomyces rouxii, there seems to be little relationship between the extracellular polysaccharides of yeast and the structural polysaccharides of the cell wall. However, the composition of the extracellular polysaccharides may prove of some value as a taxonomic aid. (Author)
AD-656 544 Not available from CFSTI.

DETERMINATION OF IODIDE CLEARANCE AND EXIT RATE CONSTANTS IN INCUBATED THYROID LOBES,
Army Medical Research and Nutrition Lab Denver Colo Physiology Div
For primary bibliographic entry see Field 6P.
AD-656 552 Not available from CFSTI.

DEVELOPMENT OF AN ORALLY EFFECTIVE INSECT REPELLENT.
IIT Research Inst Chicago Ill
For primary bibliographic entry see Field 6F.
AD-656 620 HC$3.00 MF$0.65

NON-THERMAL EFFECTS OF ALTERNATING ELECTRICAL FIELDS ON BIOLOGICAL STRUCTURES.
Progress rept. for 1 Jan 66-31 Dec 66,
Pennsylvania Univ Philadelphia
Herman P. Schwan, and Lawrence D. Sher. 1 May 67, 8p
Contract Nonr-551 (52)

Descriptors: (*Blood, Freezing), Melting, Containers, Plastics, Thickness, Storage, Dielectric properties, Relaxation time, Melting, Erythrocytes, Electric fields.

The objective of the study was to investigate experimentally and theoretically non-thermal (and some thermal) effects of alternating electrical fields on biological structures. A theoretical investigation into electrical means for the rapid thawing of frozen blood was also initiated.
AD-656 736 HC$3.00 MF$0.65

THE ROLE OF PUTRESCINE IN MICROBIAL METABOLISM.
Final rept. 1 Sep 65-31 Aug 66,
New Hampshire Univ Durham
Edward J. Herbst. 3 Aug 67, 9p
Contract Nonr-3710 (02)

Descriptors: (*Metabolism, Amines), (*Amines, Microanalysis), Tissues (Biology), Insects, Bacteria, Quantitative analysis, Thin layer chromatography, Nucleic acids, Ribosomes, Degradation, Proteins, Biosynthesis, Polymers.
Identifiers: Putrescine.

A sensitive and reliable quantitative method for the analysis of naturally-occurring polyamines was developed. The method is applicable to animal and plant tissues, insects and bacteria. The procedure will detect 0.5 millimicromole of putrescine, spermidine and spermine and is a fast and accurate method for the analysis of the polyamines by thin-layer chromatography. Polyamines react with nucleic acids and the contract research has extended knowledge on the mechanism and possible biological function of polyamine-nucleic acid interactions. Polyamines inhibit the degradation (turnover) of ribosomes at low concentrations, at high concentrations of polyamines, the turnover of ribosomes is stimulated. Both inhibitory and stimulatory concentrations of polyamines are within the limits of the occurrence of these polycations in living

cells. The polyamines act synergistically with Mg (+) ion in the stabilization of the functional ribosome particles which are essential for protein synthesis. The polyamines compete with K (+) ion, which increases the proportion of inactive ribosome particles. The research has contributed to the important knowledge of regulatory mechanisms in growth processes. (Author)
AD-656 737 HC$3.00 MF$0.65

SEARCH FOR BIOLOGICAL PRECURSOR MOLECULES IN VOLCANIC VOLATILE SYSTEMS SEMIANNUAL STATUS REPORT, SEP. 1966 - MAR. 1967.
Hawaii Univ., Honolulu. Geochemistry Div.
For primary bibliographic entry see Field 6C.
For abstract, see STAR 05 18.
N67-31642 HC$3.00 MF$0.65

ULTRAWEAK LUMINESCENCE ACCOMPANYING BIOCHEMICAL REACTIONS.
National Aeronautics and Space Administration, Washington, D. C.
YU. A. Vladimirov. Jul 67, 81p NASA-TT-F-456
Transl. Into English of the Book "sverkhslabyye Svecheniya Pri Bio- Khimicheskiyh Reaktsiya" Moscow, Izd. Nauka, 1966

Descriptors: *Biochemistry, *Chemical reaction, *Luminescence, Bibliography, Biological, Chemical, Chemiluminescence, Coolant, Counter, Generation, Liquid, Mitochondria, Nitrogen, Photochemistry, Photomultiplier, Photon, Quantum, Reaction, System, Weak.

For abstract, see STAR 05 18.
N67-31815 HC$3.00 MF$0.65

DEVELOPMENT OF BLOOD-COMPATIBLE POLYMERIC MATERIALS.
Summary rept. 1 Jul-31 Dec 66,
Battelle Memorial Inst., Columbus, Ohio. Columbus Labs.
R. D. Falb, G. A. Grode, M. T. Takahashi, and R. I. Leininger. 30 Mar 67, 66p
Contract PH-43-64-496

Descriptors: (*Prosthetics, Polymers), (*Polymers, *Blood coagulation), Heparin, Anticoagulants, Interfaces, Surface properties, Compatibility, Surgical techniques, Blood transfusions, Optimization, Mechanical organs, In vivo analysis, Implants, Silicone plastics, Propenes, Styrene plastics, Fluorescent antibody techniques.

The two primary goals of the research described in this report were (1) optimization of techniques for producing blood-compatible surfaces and (2) development of an understanding of the basic nature of blood/foreign-surface interactions. Of fifteen heparinized polymers, the three that were selected for intensive optimization work were silicone rubber, polypropylene, and Hydrin rubber.
PB-175 668 HC$3.00 MF$0.65

6B. Bioengineering

BIOMEDICAL APPLICATIONS OF NASA SCIENCE AND TECHNOLOGY QUARTERLY PROGRESS REPORT, 15 DEC. 1966 - 14 MAR. 1967.
Research Triangle Inst., Durham, N. C. Solid State Lab.
J. N. Brown, Jr.. 14 Mar 67, 42p NASA-CR-85969, EU-279
Contract NSR-34-004-035

Descriptors: *Aerospace technology, *Biotechnology, *Medicine, *Nasa program, Aerospace, Electrophoresis, Holography, Low temperature, Lubricant, Microtome, Science, Technology, Transfer, Ultrasonic, Utilization, Vidicon.

For abstract, see STAR 05 18.
N67-32617 HC$3.00 MF$0.65

6C. Biology

BACKWARD-DIRECTED FUNGAL HYPHAL BRANCHING,
National Research Council of Canada Saskatoon (Saskatchewan) Prairie Regional Lab
R. H. Haskins. 1967, 2p
NRC-9491
Availability: Published in Nature v214 n5087 p517-8 Apr 29 1967.

Descriptors: (*Fungi, Growth), Morphology (Biology).

Young hyphae of filamentous fungi generally grow outward in a straight line from their point of origin in a colony. The branches of the hypha grow at a more or less acute angle to the parent hypha and in a forward-pointing direction. They never grow backwards into the colony except under unusual experimental conditions. There are exceptions. The clamp connexions of the Basidiomycetes, on initiation, grow backwards, as may the fusion cell in crozier formation in the Ascomycetes. Another exception may be found among the mycelial strand-forming fungi such as Merulius lacrimans, where thigmotropically sensitive 'tendril' hyphae may grow backwards (or forwards) along the wide main hyphae. The fungus, P.R.L. 2176 (similar to Trichosporon Behrend except that it produces aerial fruiting heads), now under intensive investigation, presents an exception which seems not to come under the category of Robertson's 'unusual experimental conditions'. (Author)
AD-655 871 Not available from CFSTI.

A MODEL OF THE AVIAN RETINA.
Douglas Aircraft Co Inc Newport Beach Calif Astropower Lab
For primary bibliographic entry see Field 6D.
AD-655 907 HC$3.00 MF$0.65

THE ENERGY BUDGET AT THE EARTH'S SURFACE: PRELIMINARY WIND TUNNEL STUDIES OF THE PHOTOSYNTHESIS AND TRANSPIRATION OF FORAGE STANDS.
Interim research rept.,
Agricultural Research Service Ithaca N Y Soil and Water Conservation Research Div
L. A. Hunt, I. I. Impens, and E. R. Lemon. Dec 66, 27p Rept no. RR-390
ECOM-2-661-2

Descriptors: (*Photosynthesis, *Grasses), (*Evapotranspiration, Grasses), Wind tunnels, Intensity, Measurement, Wind, Efficiency, Water, Tests.

Vegetative stands of alfalfa and orchardgrass, grown in flats in a glasshouse, were investigated in a small wind tunnel. The windspeed parameters of the crop surfaces were determined at low radiation intensity at each of two windspeeds; and the rates of net photosynthesis and evapotranspiration were measured at the two windspeeds at each of three radiation intensities. The roughness length (zo) increased with windspeed and was greater in orchardgrass. Rate of net photosynthesis, but not evapotranspiration, also increased with windspeed. In consequence, water-use was most efficient under the highest wind regime. The rate of net photosynthesis increased to the intermediate radiation intensity, whereas evapotranspiration increased and water-use efficiency decreased to the highest radiation regime. The work indicated that a small wind tunnel of the type described would be useful for further studies of the photosynthesis and transpiration of forage stands. (Author)
AD-655 910 HC$3.00 MF$0.65

ORAL INSECT REPELLENTS - INSECT TASTE RECEPTORS AND THEIR ACTION,
Alberta Univ Edmonton Dept of Entomology
For primary bibliographic entry see Field 6F.
AD-655 928 HC$3.00 MF$0.65

A SIMPLE COLLAR DEVICE FOR THE PROTECTION OF SKIN GRAFTS IN MICE,
Walter Reed Army Inst of Research Washington D C
For primary bibliographic entry see Field 6L.
AD-655 942 Not available from CFSTI.

FIBROUS GINGIVAL HYPERPLASIA OF A MUSTACHE GUENON MONKEY (CEROCOPITHECUS CEPHUS),
Army Medical Research Lab Fort Knox Ky
Winslow G. Sheldon. 13 Jun 67, 10p Rept no. US-AMRL-736
Availability: Published in Laboratory Animal Care v17 n1 p140-3 1967.

Descriptors: (*Monkeys, Diseases), (*Mouth, Diseases), Surgery, Excision, Histology, Infections, Dentistry, Healing, Pathology.

The occurrence of a case of fibrous gingival hyperplasia in an adult Mustache Guenon monkey is described. The large, firm, pale-pink fibrous gingival masses were surgically removed, and the animal was observed for 15 months after the operations. Recurrence of the hyperplastic gingiva was limited to a small area in the region of the upper right first molar. The histological appearance of the excised gingiva was that of relatively avascular mature fibrous tissue underlying a parakeratotic and hyperkeratotic epithelium. The rete pegs of the epithelium extended deep into the thick layer of fibrous tissue. Inflammation was not prominent except in areas of superficial local infection. (Author)
AD-655 950 Not available from CFSTI.

STEMPELLIA MAGNA (KUDO) (NOSEMATIDAE: MICRO-SPORIDIA) IN CULEX RESTUANS THEOBALD FROM VIRGINIA,
Walter Reed Army Inst of Research Washington D C
Donald L. Bailey, William W. Barnes, and Robert W. Dewey. 1967, 4p
Availability: Published in Mosquito News v27 n1 p111-4 Mar 1967.

Descriptors: (*Culex, *Parasitic diseases), Larvae, Spores, Protozoa, Entomology.

A new geographic record of the micro-sporidian Stempellia magna is reported. Late instar Culex restuans larvae collected on June 23, 1966 at Falls Church, Virginia had a 35 percent incidence of infection. Later collections of mixed species from the same site showed infections only in C. restuans. Anopheles stephensi larvae reared in water from the site produced a frank infection, with mature spores, in a single larva and several larvae with early developmental stages of the parasite indicating per os transmission. (Author)
AD-656 134 Not available from CFSTI.

TRANSLATIONAL VARIATIONS IN THE AMINO ACID SEQUENCE OF THE ALPHA-CHAIN OF RABBIT HEMOGLOBIN,
Johns Hopkins Univ Baltimore Md Dept of Biophysics
Gunter von Ehrenstein. Jul 67, 12p
AFOSR-67-1631
Contract AF 49 (638)-1304
Availability: Published in Cold Springs Harbor Symposia on Quantitative Biology v31 p705-14 1966.

Descriptors: (*Genetics, Hemoglobin), (*Hemoglobin, *Amino acids), Peptides, Ribonucleic acids, Purification, Chromatographic analysis.
Identifiers: Coding (Genetics), Leucine.

Transfer experiments in the reticulocyte ribosomal system using separate E. coli transfer RNA's for leucine had indicated that one leucine position in the alpha chain is different from all the other leucine positions in rabbit hemoglobin. In addition, the amino acid composition of the relevant peptides led to the belief that this leucine position might also be special in its structure (Weisblum, Gonano, von Ehrenstein and Benzer, 1965). The experiments reported were undertaken to determine the position of the exceptional leucine codon in the amino acid sequence of the alpha chain. Evidence that this codon is in position 48 are presented. As the studies on the amino acid sequence of the alpha chain progressed, the suspicion was confirmed that position 48 was not only exceptional in this response to a minor leucine transfer RNA, but also, that leucine was not the only amino acid occupying the position. In the alpha chain from a single rabbit about 50 per cent leucine and 50 per cent phenylalanine were found in position 48. So far five other positions in the alpha chain have been found to contain more than one amino acid. The paper constitutes a progress report on the structural work on rabbit hemoglobin, and considers experimental attempts to establish whether the amino acid multiplicities are due to a multiplicity of alpha chain templates or whether they are due to the ambiguous translation of a unique template. (Author)
AD-656 222 Not available from CFSTI.

EFFECT OF SOIL MOISTURE AND SOIL TEMPERATURE ON BLACK SHANK DISEASE DEVELOPMENT IN TOBACCO,
Fort Detrick Frederick Md
S. M. McCarter. 5 Jan 67, 5p
Availability: Published in Phytopathology v57 n7 p691-5 Jul 1967.

Descriptors: (*Tobacco, *Soils), (*Diseases, Fungi), Moisture, Temperature, Environmental tests, Growth, Fertilizers, Tables.

Phytophthora parasitica var. nicotianae infected susceptible (Burley 21) and resistant (Burley 11B) tobacco plants growing in soil with moisture levels ranging from 19 to near 100% of moisture-holding capacity. The fungus killed most Burley 21 plants at each of four moisture contents tested, although the disease developed slightly faster when moisture was high. Generally, the disease was most severe on Burley 11B and Burley 37 (resistant) plants when moisture was abundant, although Burley 11B plants were infected severely when moisture was 19% of moisture-holding capacity. The latter suggests a relationship between moisture stress and disease severity. Burley 21 seedlings, 6 cm tall, were killed at temperatures from 16 to 30 C. Disease development was accelerated with increasing temperature in this range. Burley 11B and Burley 37 seedlings of the same age were killed only at 28 to 30C, although infection occurred at 16 and 20 C. Burley 21 plants in the three- to four-leaf and seven- to eight-leaf stages were killed at 24 and 31 C. Some Burley 11B and Burley 37 plants inoculated in the three- to four-leaf stage were killed at 24 and 31 C. When inoculated in the seven- to eight-leaf stage, some of these plants were killed at 31 C but none was killed at 24 C. The optimum temperature for the growth of the fungus on oatmeal agar was 28 to 30 C. (Author)
AD-656 551 Not available from CFSTI.

ACOUSTIC INTENSITY LIMENS IN THE GOLDFISH,
American Museum of Natural History New York Dept of Animal Behavior
David W. Jacobs, and William N. Tavolga. 1967, 12p
Contract Nonr-552 (06), Grant NSF-GP-4364
Prepared in cooperation with Fairleigh Dickinson Univ., Teaneck, N. J., and City Coll. of the City of New York.
Availability: Published in Animal Behaviour v15 n2-3 p324-35 Apr/Jul 1967.

Descriptors: (*Fishes, Auditory perception), Thresholds (Physiology), Audiometry, Psychophysics, Noise, Sound, Responses, Behavior.

Thresholds for acoustic stimuli and discrimination limens for different acoustic intensities were obtained in the goldfish, Carassius auratus, by means of avoidance conditioning techniques. The audiogram for this species, based on mean thresholds determined by the staircase audiometric method, ranged from about -25 dB (re 1 microbar at 50 Hz o a low point of almost -46 dB at 500 Hz and rose to -2 dB at 2000 Hz. Above this point the audiogram rose sharply and the practical limit of hearing was at 3000 Hz with a threshold value of about +22 dB. Comparison with other species showed that the sensitivity and frequency range of the goldfish, as well as of other ostariophysine species (possessing a Weberian apparatus), were significantly greater than in other teleosts. Based upon measurements of ambient noise, it was assumed that these threshold values were not masked by external noise. Goldfish were found to be capable of discriminating the intensity of two pure tones when the difference between the two was from 3 to 6 dB of acoustic pressure. Over a range of 30 dB there was no significant difference in the discrimination limen. This limen is smallest in the 300 to 400 Hz range and increases sharply above 1000 Hz. The upper limit of any frequency discrimination is about 1500 Hz. Comparisons of these data with mammalian auditory capacities show both quantitative and qualitative differences, and the problem of distinguishing between the pressure (far-field) and displacement (near-field) reception is discussed. (Author)
AD-656 556 Not available from CFSTI.

ISRAEL SOUTH RED SEA EXPEDITION REPORTS, BULLETIN NO. 43, 1962.
Tel-Aviv Univ (Israel) Dept of Zoology
For primary bibliographic entry see Field 8A.
AD-656 727 Not available from CFSTI.

ISRAEL SOUTH RED SEA EXPEDITION REPORTS, BULLETIN NO. 46, 1962.
Tel-Aviv Univ (Israel) Dept of Zoology
For primary bibliographic entry see Field 8A.
AD-656 728 Not available from CFSTI.

THE ROLE OF PUTRESCINE IN MICROBIAL METABOLISM.
New Hampshire Univ Durham
For primary bibliographic entry see Field 6A.
AD-656 737 HC$3.00 MF$0.65

TROPISTIC BEHAVIOR IN SCHISTOSOMIASIS: MIRACIDI AND CERCARIAE PREDATORS.
Annual rept. no. 1, Jul 66-Jun 67,
Minas Gerais Univ Belo Horizonte (Brazil) Instituto de Biologia
Jose Pellegrino. Jun 67, 11p
Grant DA-ARO-49-092-66-G134

Descriptors: (*Schistosoma, Rhythm (Biology)), Life cycle, Behavior, Gastropoda, Parasites, Diurnal variations, Photosensitivity (Biological), Radiation effects, Ecology, Temperature, Brazil.

Some aspects of the behavior of Schistosoma mansoni cercariae were investigated. A linear relationship between temperature and the speed during upward displacement of cercariae was found for the range from 8 to 40C. Most of S. mansoni cercariae are shed by infected B. glabrata within a daily 6-hour period. The peaks of emergence were found to be between 9 a.m. to 11 a.m. and 1 p.m. to 3 p.m. at San Juan and Belo Horizonte, respectively. The emergence rhythm is environmental dependent (exogenous rhythm). The rhythm is suppressed when infected snails are kept in the dark and under constant temperature. The rhythm is kept when infected snails are maintained under constant temperature but subjected to the cyclic diurnal variation of light. The rhythm is also maintained under cyclic diurnal temperature variation although the snails remain in darkness. The rhythm can be reversed by the inversion of the light-darkness periods as well as by the inversion of the daily cyclical temperature variation. Preliminary observations on the radiation effect on infected snails are reported. (Author)
AD-656 765 HC$3.00 MF$0.65

RODENTS, THEIR ECTO-PARASITES AND ECOLOGY IN WESTERN TURKEY.
Professional rept.,
Department of the Air Force New York 09224 Tuslog Detachment 36 (Usafe)
Dean A. Garrett, George W. Powell, and Jerry S. Agee. 22 Jun 67, 22p Rept no. Det-36-TR-67-3

Descriptors: (*Rodents, Parasitic diseases), Disease vectors, Periodic variations, Climatology, Ecology, Epidemiology, Turkey.

Since July 1965, 250 rodents were collected in 4 areas located in the middle of Turkey's western (Aegean) coast. Over 1000 ecto-parasites were removed from these rodents. Some are known to be potential disease vectors. This report presents a preliminary identification of the rodents and parasites and describes some of the ecological parameters (climate, season, vegetation) of their habitat. (Author)
AD-656 774 HC$3.00 MF$0.65

SEARCH FOR BIOLOGICAL PRECURSOR MOLECULES IN VOLCANIC VOLATILE SYSTEMS SEMIANNUAL STATUS REPORT, SEP. 1966 - MAR. 1967.
Hawaii Univ., Honolulu. Geochemistry Div.
J. J. Naughton. Mar 67, 2p NASA-CR-85612
Contract NGR-12-001-012

Descriptors: *Gas composition, *Geochemistry, *Volcanics, Carbon, Chromatography, Composition, Compound, Element, Gas, Hawaii, Molecule, Precursor, System, Volatile.

For abstract, see STAR 05 18.
N67-31642 HC$3.00 MF$0.65

ORIENTOMETER-A MULTI-DIRECTIONAL TREADMILL FOR THE ANALYSIS OF ORIENTATION,
Harvard Univ., Cambridge. Dept. of Biology.
For primary bibliographic entry see Field 6L.
PB-175 625 HC$3.00 MF$0.65

INVESTIGATING DOMINANCE IN DOUGLAS-FIR STANDS.
Pacific Northwest Forest and Range Experiment Station, Portland, Ore.
For primary bibliographic entry see Field 2F.
PB-175 656 HC$3.00 MF$0.65

6D. Bionics

A MODEL OF THE AVIAN RETINA.
Final rept., Apr 66-Jan 67,
Douglas Aircraft Co Inc Newport Beach Calif Astropower Lab
R. G. Runge, S. S. Viglione, and M. Uemura. May 67, 87p
AMRL-TR-67-60
Contract AF 33 (615)-3736

Descriptors: (*Pigeons, Retina), (*Bionics, Vision), Models (Simulations), Ganglia, Nerve cells,

Optic nerve, Electrophysiology, Pattern recognition, Eye.

The specific objective of this contract was to construct an electronic model of the avian retina based upon reported physiological and anatomical findings and capable of replicating the specific ganglion functional responses. A critical review of the pertinent physiological and anatomical literature ralting to the retina was performed. The electronic model of the pigeon retina containing the six functional classes of ganglion detectors reported in the literature was constructed. In addition the model incorporates two hypothetical detectors to demonstrate the selective performance that can be achieved with artificial neuron networks. The development of the model has shown that the complex data processing of the retina can be functionally duplicated. The results of this work could lead to the design of an effective visual data preprocessor which would operate into a self-organizing decision network to yield a multilayer optical pattern recognition system. (Author)
AD-655 907 HC$3.00 MF$0.65

TEXAS BIANNUAL OF ELECTRONICS RESEARCH, NO. 5.
Texas Univ Austin Labs for Electronics and Related Science Research
For primary bibliographic entry see Field 9C.
AD-656 349 HC$3.00 MF$0.65

CREATIVITY AND CYBERNETICS,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 5J.
AD-656 568 HC$3.00 MF$0.65

6E. Clinical Medicine

RESULTS OBTAINED TO DATE FROM A STUDY OF THE EFFECTS OF IONIZING IRRADIATION AND ITS EFFECT UPON FORMATION AND DEVELOPMENT OF THE HEALING WOUND.
Texas Univ., Dallas. Southwestern Medical School.
For primary bibliographic entry see Field 6R.
AD-412 857 HC$3.00

SALT LOADING AS A POSSIBLE FACTOR IN THE PRODUCTION OF POTASSIUM DEPLETION, RHABDOMYOLYSIS, AND HEAT INJURY,
Brooke Army Medical Center Fort Sam Houston Tex Army Surgical Research Unit
James P. Knochel, and Robert M. Vertel. 1967, 7p
Availability: Published in The Lancet p639-61 Mar 25 1967.

Descriptors: (*Heat tolerance, Potassium), Acclimatization, Sodium chloride, Exercise, Excretion, Stress (Physiology), Perspiration, Metabolism, Ingestion (Physiology).

The benefits of supplementary salt in unacclimatised people performing physical labour in humid heat are well known: without suitable quantities of salt and water there is a risk of hypertonic dehydration and cardiovascular collapse. Features of potassium depletion, including hypokalaemia, pitressinresistant polyuria, and possibly rhabdomyolysis, occur in a number of young men with heat injury. Those who seem to constitute a high-risk group are military recruits or football players undergoing training or conditioning in the summer months. Acclimatisation to heat is accompanied by increased aldosterone excretion and an expanded extracellular fluid space. Since salt loading may not suppress aldosterone production in the heat-acclimatising individual, salt loading may well lead to serious potassium depletion. The widespread practice of vigorous salt supplementation in military and athle'ic training programmes may thus induce significant potassium losses in these individuals. Evidence is presented which suggests that potassium depletion may constitute an important factor in the production of certain forms of injury observed in those undergoing strenuous exertion in hot climates. (Author)
AD-655 875 Not available from CFSTI.

TECHNIQUE FOR THE AUTOMATIC GENERATION OF BIBLIOGRAPHIES (A BIOMEDICAL INFORMATION APPLICATION),
General Dynamics/Convair San Diego Calif
M. A. Newcomb, and R. A. Benson. 15 Dec 65, 468p Rept no. GDC/C-ERR-AN-816

Descriptors: (*Mechanical organs, Heart), (*Heart, Bibliographies), Indexes, Subject indexing, Information retrieval.
Identifiers: Coordinate indexing.

The bibliography generation technique has proved to be an important tool for the rapid compilation of large numbers of searchable literature citations. The KARDIAK/MEDITERM bibliography demonstrates that it is unnecessary to employ a specialist in the field to index citations using this system. The keypuncher/indexer is able to function efficiently with minimal instructions. Initial input on paper tape with subsequent conversion to punched cards alleviates the problem of error correction and verification while providing a hard copy record of all input documents. Standard information storage and retrieval computer programs were used for this task, with the exception of the 'Yellow Dog' FORTRAN language program for the generation of header cards. S-C 4020 formats were used which provided the most convenient and easy-to-read layout for the dual dictionary as well as the citation and author listings. (Author)
AD-655 925 HC$3.00 MF$0.65

STUDIES OF LIFE SPAN DIETARY SODIUM CHLORIDE TOXICITY IN ANIMALS.
Annual progress rept. 1 Aug 66-15 Jul 67,
Vanderbilt Univ Nashville Tenn School of Medicine
John B. Youmans. 1967, 10p
Contract DA-49-193-MD-2425

Descriptors: (*Sodium chloride, Toxicity), Responses, Nutrition, Hypertension, Sex, Genetics, Atherosclerosis, Diet, Blood pressure, Pathology, Electrocardiography, Body weight, Metabolism, Aging (Physiology), Tolerances (Physiology), Dogs.

The objective of the research was to determine whether consistent, significant differences in response to life span dietary sodium chloride levels occur in dogs, and, if so, the influence of sex and genetics and exploration of the significance in the occurance of arterial hypertension and atherosclerosis in man. Twenty-five beagles (10 males and 15 females) from unrelated AKC registered litters, whelped May 1965 had carotid loop procedures October 1965, baseline physiologic measurements until Feb. 1966, when 1 male and 1 female from each litter were randomly assigned to rations containing 1.5, 6 and 12% NaCl. Daily maintenance and primary care, monthly veterinary inspection, blood pressure measurements, weighing, quarterly urine and blood collections and bi-annual ECGs are done at a farm in a converted dairy barn. Gross and microscopic pathology, serology, and urinalysis are done in medical school laboratories. Weights remained relatively constant. Mean arterial blood pressures continued close to baseline with occassional pressures of 130 mm/HG or more not notable between litters, sexes, or % NaCl in rations. No abnormalities in urinalysis, blood components and metabolic constituents or electrocardiograms were observed. The slight elevations in serum cholesterol are probably attributable to change from puppy to adult. (Author)
AD-655 929 HC$3.00 MF$0.65

CORRELATION OF JEJUNAL FUNCTION AND MORPHOLOGY IN PATIENTS WITH ACUTE AND CHRONIC DIARRHEA IN EAST PAKISTAN.
Revised ed.,
Walter Reed Army Inst of Research Washington D C
Thomas H. Kent, and John Lindenbaum. 23 Jan 67, 14p
Revision of manuscript submitted 26 Jul 66.
Availability: Published in Gastroenterology v52 n6 p9721-84 1967.

Descriptors: (*Intestines, Biopsy), (*Digestive system diseases, Pathology), Histology, Morphology (Biology), Absorption (Biological), Diarrhea, Deficiency diseases, Diagnosis, Pakistan.

Small intestinal biopsies obtained from residents of East Pakistan with a variety of clinical conditions were graded as to severity of morphological alteration under the dissecting microscope and on histological sections. The jejunal lesions were similar in character in patients with acute diarrheal illnesses, chronic malabsorption syndromes, and in normal control individuals, but there were differences in the severity of damage. The jejunitis was most severe during or shortly after an acute diarrheal episode or in patients with chronic malabsorption of unknown cause ('tropical sprue'). The lesions became less severe following recovery from acute diarrhea and in some individuals with chronic malabsorption treated with tetracycline. The degree of mucosal damage correlated moderately well with xylose absorption, less well with fat absorption and least well with vitamin B12 absorption. Absorptive function correlated better with the histological appearance of jejunal mucosa than with the architectural patterns observed under the dissecting microscope. (Author)
AD-655 943 Not available from CFSTI.

ELECTRON-MICROSCOPE STUDIES OF EXPERIMENTAL SALMONELLA INFECTION IN THE PRECONDITIONED GUINEA PIG. II. RESPONSE OF THE INTESTINAL MUCOSA TO THE INVASION BY SALMONELLA TYPHIMURIUM,
Walter Reed Army Inst of Research Washington D C
Akio Takeuchi, and Helmuth Sprinz. 28 Feb 67, 25p
Availability: Published in The American Journal of Pathology v51 p137-61 Jul 1967.

Descriptors: (*Salmonella, Diseases), Intestines, Membranes (Biology), Mucus, Responses, Penetration, Septicemia, Phagocytes, Degradation, Histology, Blood circulation, Blood platelets, Electron microscopy, Morphology (Biology), Pathology.

A diffuse, acute enteritis developed in guinea pigs, preconditioned by starvation and opium, following intragastric administration of Salmonella typhimurium. The anatomic lesion depended on the invasion of the intestinal mucosa by the bacterial organisms. The penetration of the intestinal epithelial barrier occurred in 2 stages. The bacteria first penetrated the epithelial lining of the intestinal villi and then, following a 24-hr. lapse, the lining of the crypt glands. While bacterial organisms were rapidly cleared from the gut lumen and the epithelial lining, they persisted in the lamina propria and even proliferated within macrophages. The animals succumbed to the systemic infection with bacteremia within 72 hr. The earliest alteration of the ileum was the localized degeneration of the brush border at 12 hr. which was limited to the site of bacterial penetration and which appeared transient and reversible in nature. In contrast, the microvillous alteration at 24 hr. and thereafter diffusely involved the villous epithelium, irrespective of the presence of intraepithelial bacteria, and seemed permanent and irreversible in character.

The epithelial changes ranged from derangement of the endoplasmic reticulum to severe degenerative alterations comparable to those seen in acute shigella enteritis. As the enteric lesion developed, vascular changes in the gut mucosa became evident and were characterized early by intravascular platelet thrombi and later by alterations of the thrombosed vessel wall. The study sheds additional light on the mechanism of cellular responses of the gut mucosa to the invasion of enteric pathogens and on the altered intestinal microcirculation in the presence of bacterial infection. (Author)
AD-655 944 Not available from CFSTI.

THE TOXICITY OF ALKYL 2-CYANOACRYLATE TISSUE ADHESIVES: BRAIN AND BLOOD VESSELS,
Walter Reed Army Inst of Research Washington D C
Ralph A. W. Lehman, and George J. Hayes. 1967, 8p
Availability: Published in Surgery v61 n6 p915-22 Jun 1967.

Descriptors: (*Surgical techniques, Acrylic resins), (*Acrylic resins, Toxicity), Adhesives, Tissues (Biology), Cerebral cortex, Blood vessels, Pathology, Mortality rates, Dogs.
Identifiers: Polycyanoacrylates.

Alkyl 2-cyanoacrylate adhesives were deposited upon the cerebral cortex and optic chiasm of dogs and monkeys, respectively. All survivors were killed at predetermined intervals and the tissues examined microscopically. All of these adhesives are capable of inducing the formation of a fibrous membrane between the adhesive and the cortex. All of the cyanoacrylates tested demonstrated definite neural toxicity. The relative toxicity of the cyanoacrylates tested was found to be in the order of alkyl side chain length: methyl, ethyl, isobutyl, n-propyl, and finally n-octyl. Of these, the methyl and ethyl compounds exhibited markedly more toxicity than the others. The underlying role of vascular damage in the production of many of the lesions is emphasized. (Author)
AD-655 945 Not available from CFSTI.

FIELD TRIAL OF A MONOVALENT AND OF A BIVALENT MINERAL OIL ADJUVANT TRACHOMA VACCINE IN TAIWAN SCHOOL CHILDREN,
Washington Univ Seattle Dept of Preventive Medicine
Robert L. Woolridge, J. Thomas Grayston, I. H. Chang, K. H. Cheng, and C. Y. Yang. May 67, 10p
NAMRU-2-TR-275
Grant PHS-NB-03144
Availability: Published in American Journal of Ophthalmology v63 n5 pt2 p1645/619-1650/624 May 1967.

Descriptors: (*Vaccines, Effectiveness), (*Chlamydia trachomatis, Vaccines), Viability, Injection (Medicine), Children, Infections, Ophthalmology, Immunity, Taiwan.

Two formalin treated purified trachoma vaccines (TW-3 monovalent and TW-1 + TW-3 bivalent) were tested in school aged children in central Taiwan. Both vaccines were given in mineral oil adjuvants to separate groups of children in 2 injections. The cumulative conversion to trachoma of the children receiving bivalent vaccine followed for 2 to 3 years showed a low protection potency of the vaccine. This correlates well with the low particle count given the children. Children receiving monovalent vaccine showed a statistically significant deleterious effect. Nearly two and a half times as many children developed trachoma among those given vaccine as in the placebo group. The results are reminiscent of findings in cross protection studies in monkeys where immunization sufficient to prevent homologous infection resulted in more severe heterologous infection than was observed in controls. (Author)
AD-656 297 Not available from CFSTI.

NATURAL HISTORY OF TRACHOMA IN TAIWAN SCHOOL CHILDREN,
Washington Univ Seattle Dept of Preventive Medicine
R. L. Wooldridge, J. T. Grayson, E. B. Perrin, C. Y. Yang, and K. H. Cheng. May 67, 12p
NAMRU-2-TR-276
Grant PHS-NB-03144
Availability: Published in American Journal of Ophthalmology v63 n5 Pt2 p287-94 May 1967.

Descriptors: (*Chlamydia trachomatis, Diseases), (*Eye, Infectious diseases), Children, Healing, Vaccines, Allergy, Pathology, Immunity, Ophthalmology, Taiwan.

First grade school children entering school in central Taiwan in 1960, 1961 and 1962 were examined periodically for the presence of trachoma infection. The 1960 group was followed through 1966 and the other 2 groups through 1964. The series of eye diagnosis in individual children show many patterns other than simple conversion from normal to trachomatous eyes. Reversion from trachomatous to normal or inactive eyes was frequent. Periodic reinfection and reconversion to normal or inactive trachoma were also seen. The results give the impression that on Taiwan, trachoma is a disease where healing may occur without scarring and reinfection and relapse are common. The conclusions are supported by repeated examinations of children who were subjects in trachoma vaccine field trials. These findings support the growing opinion that trachoma is a reinfectious disease in which the development of hypersensitivity to the organism contributes to the pathogenesis of the disease, particularly in the formation of pannus and scarring. (Author)
AD-656 298 Not available from CFSTI.

LONG-TERM FOLLOW-UP OF THE INITIAL (1959-1960) TRACHOMA VACCINE FIELD TRIAL ON TAIWAN,
Washington Univ Seattle Dept of Preventive Medicine
R. L. Wooldridge, J. T. Grayson, I. H. Chang, C. Y. Yang, and K. H. Cheng. May 67, 8p
NAMRU-2-TR-277
Grant PHS-NB-03144
Availability: Published in American Journal of Ophthalmology v63 n5 Pt2 p625-7 May 1967.

Descriptors: (*Vaccines, Effectiveness), (*Chlamydia trachomatis, Vaccines), Injection (Medicine), Children, Infections, Immunity, Ophthalmology, Taiwan.

The initial trachoma vaccine field trial was begun on Taiwan in 1959-1960, in preschool-aged children utilizing vaccine partially purified with polymyxin. At the end of two years of observation, the vaccine had reduced the incidence of trachoma by 60%. However, beginning two and one-half to three years after initiation of the study, which was a year after the final booster vaccine inoculation, the protection afforded the vaccinated children began to disappear and at the end of six years of observation, both groups showed about 50% conversion to trachoma. This study demonstrates that trachoma can be prevented with vaccine but points out that more effective inoculation schedules, or more powerful vaccines, or adjuvants will be needed to prolong the protective effect. Field testing such vaccines will require long-term observation to assess the impact of the vaccine on the disease. (Author)
AD-656 299 Not available from CFSTI.

FAILURE OF TRACHOMA TREATMENT WITH OPHTHALMIC ANTIBIOTICS AND SYSTEMIC SULFONAMIDES USED ALONE OR IN COMBINATION WITH TRACHOMA VACCINE,
Washington Univ Seattle Dept of Preventive Medicine
Robert L. Wooldridge, K. H. Cheng, I. H. Chang, C. Y. Yang, and T. C. Hsu. May 67, 11p
NAMRU-2-TR-278
Grant PHS-NB-03144
Availability: Published in American Journal of Ophthalmology v63 n5 Pt2 p553-7 May 1967.

Descriptors: (*Chemotherapeutic agents, *Chlamydia trachomatis), Vaccines, Antibiotics, Children, Tetracyclines, Infectious diseases, Ophthalmology, Effectiveness.

Three field trials designed to explore the usefulness of trachoma vaccine in combination with drug therapy have been carried out in Taiwan school children with active trachoma infection. Each of the studies was a failure because of the inability to cure trachoma with tetracycline eye ointment therapy alone or combined with increasing amounts of triple sulfa drug orally. No reason was found for the failure of the standard drug treatment schedules to cure trachoma. It is clear that in these experiments where the treatment was inadequate, addition of trachoma vaccine showed no favorable effect on hastening the cure of the disease. Vaccine alone showed no effect on active trachoma. In one experiment, it was possible to show that there were fewer relapses or reinfections in children whose trachoma became inactive after vigorous therapy. This finding was not well established because the extremely low cure rate associated with drug therapy in the three trials did not provide adequate numbers for evaluation. (Author)
AD-656 300 Not available from CFSTI.

MYCOPLASMA PNEUMONIAE: COMPLEMENT-FIXING ANTIBODY TITERS AT BIRTH,
Army Medical Research and Nutrition Lab Denver Colo
O. L. Weiser, H. H. Higaki, and L. B. Nolte. 1 Aug 66, 3p
Availability: Published in American Journal of Clinical Pathology v47 n5 p641-2 1967.

Descriptors: (*Mycoplasma, Antigens + antibodies), (*Infants, Antigens + antibodies), Immunity, Serodiagnosis, Placenta, Pleuropneumonia-like organisms.

Results of this study indicate that antibodies to Mycoplasma pneumoniae can pass the placental barrier and are detectable at low levels in the serum of the newborn. An incidence of 10.9% of the serum of infants tested demonstrated a complement-fixing titer of 1:4 or higher. Longitudinal studies are in progress to determine the persistence of these antibodies and will be reported later. (Author)
AD-656 362 Not available from CFSTI.

AN EXPERIMENTAL INDIRECT TECHNIQUE FOR THE INDUCTION OF HYPNOSIS WITHOUT AWARENESS,
Pennsylvania Hospital Philadelphia Unit for Experimental Psychiatry
For primary bibliographic entry see Field 5J.
AD-656 364 Not available from CFSTI.

SCAN RECORDING AND RESCAN IN COLOR.
Chiba Univ (Japan) School of Medicine
For primary bibliographic entry see Field 6L.
AD-656 530 HC$3.00 MF$0.65

PATHOLOGY AND SPREAD OF RENAL CELL CARCINOMA,
Armed Forces Inst of Pathology Washington D C
F. K. Mostofi. 1967, 45p
Availability: Published in Renal Neoplasia p41-85 1967.

Descriptors: (*Cancer, *Kidneys), Pathology, Histology, Morphology (Biology), Cytology, Mortality rates, Lipids, Cytoplasm, Blood vessels, Veins, Thrombosis.
Identifiers: Metastasis.

The pathology of renal cell carcinoma is briefly reviewed. Histologically, the tumors present a variegated appearance; although the clear and granular cells predominate, many other cell types, such as spindle cells, dark cells, and giant cells, may be observed. The cells usually form acinar, glandular, or tubular structures which may be large or small, regular or irregular; a few are cystic, but others occur as solid sheets. The overall survival rates of patients with renal cell carcinoma are 50% for 5 years and 34% for 10 years. About 40% of renal cell carcinomas show metastasis; about 36% show vascular invasion at the time of surgery. Histologic differentiation and cytoplasmic lipid content are of limited value in determination of prognosis, but well-differentiated tumors with clear cytoplasm have better prognosis than granular cell tumors or tumors of moderate or poor degree of differentiation. Location of tumor, size, number, encapsulation, and confinement to the renal parenchyma also affect the prognosis. The most important factors, however, are vascular invasion and the presence of metastasis at the time of operation. The mechanisms of vascular invasion and renal vein thrombosis are elucidated. (Author)
AD-656 553 Not available from CFSTI.

CORTICOID THERAPY FOR PRETIBIAL MYXEDEMA. OBSERVATIONS ON THE LONG-ACTING THYROID STIMULATOR.
Final technical rept.,
Clinical Investigation Center Oakland Calif
Frederick L. Benoit, and Francis S. Greenspan.
20 Dec 66, 13p Rept no. CIC-TR-30
Contract Nonr-222 (51), Grant PHS-AM-04818
Revision of manuscript submitted 19 Oct 66.
Availability: Published in Annals of Internal Medicine v66 n4 p711-20 Apr 1967.

Descriptors: (*Edema, Chemotherapy), (*Corticosteroid agents, Edema), Effectiveness, Thyroid gland, Diseases, Steroids, Stimulation, Dosage.

Nine patients with pretibial myxedema were treated with glucocorticoids by various methods. All of eight patients in whom the serum long-acting thyroid stimulator was measured were found to have elevated levels. All received some benefit from the therapy, the best results occurring in those treated with larger doses of drugs systemically. In addition, six of the eight patients had a lowering of the long-acting thyroid stimulator levels. Changes in serum long-acting thyroid stimulator did not seem to correlate directly with improvement in the skin lesion. The results of this study suggest that systemic corticosteroid therapy followed by long-term topical steroid application is a satisfactory method for the clinical management of pretibial myxedema. (Author)
AD-656 554 Not available from CFSTI.

LIGHT AND ELECTRON MICROSCOPIC OBSERVATIONS IN A SUPERFICIAL CORNEAL DYSTROPHY,
George Washington Univ Washington D C School of Medicine
Don G. Griffith, and Ben S. Fine. 1967, 8p
Contract DA-49-193-MD-2680, Grant PHS-NB-05575-03
Prepared in cooperation with Armed Forces Inst. of Pathology, and Walter Reed General Hospital.
Availability: Published in American Journal of Ophthalmology v63 n4 p1659-66 Jun 1967.

Descriptors: (*Cornea, Pathology), Diseases, Histology, Electron microscopy, Biopsy, Cytology, Ophthalmology.

A case of dystrophy of the anterior limiting membrane (that is, Bowman's layer or membrane) of the cornea has been reported. The clinical findings indicate that this case may tentatively be classified as an early stage of Reis-Bucklers (Bucklers IV) heredodegenerative corneal dystrophy. Limited light and electron microscopic histopathologic examination of biopsy material indicates that the changes are localized mainly to all levels of Bowman's layer and to the epithelial cell hemidesmosomes and associated basement membrane. (Author)
AD-656 557 Not available from CFSTI.

A BIBLIOGRAPHICAL SOURCEBOOK OF COMPRESSED AIR, DIVING AND SUBMARINE MEDICINE, VOLUME III,
Medical Coll of Virginia Richmond Dept of Psychiatry
For primary bibliographic entry see Field 6S.
AD-656 674 MF$0.65

FEEDING THROUGH THE SKIN WITH DIMETHYL SULFOXIDE.
Final rept. Jun-Oct 65,
Dartmouth Coll Hanover N H Wilder Lab
Robert E. Smith, Andrew M. Hegre, Jr., and Clement N. Rieffel, Jr. Jun 67, 12p
AMLC-TR-67-1

Descriptors: (*Deficiency diseases, Chemotherapy), Sulfoxides, Skin, Permeability, Nutrition, Toxicity.
Identifiers: Dimethyl sulfoxide.

The use of dimethyl sulfoxide (DMSO) to allow substances, including drugs, to pass through the skin had been reported in the literature. However, none of the studies pertained to the efficacy of using DMSO with nutrients. A seven-year-old Negro male dying of malnutrition, secondary to small bowel removal, was given several supplemental nutrients across the skin by the use of DMSO. A rise in blood glucose, serum carotene, urinary amino acids, and urinary Cobalt57B12, as well as a gain in weight after application of the nutrients to the skin, documented passage across the skin. The patient received 3,000 ml of 100 per cent DMSO during a seven-week period without evidence of toxicity. (Author)
AD-656 687 HC$3.00 MF$0.65

FIXED AND REPRODUCIBLE ORTHOSTATIC PROTEINURIA.
Final rept. (Phase I) Jan 64-Dec 66,
Wilford Hall Hospital (Air Force) Lackland AFB Tex
Frank R. Lecocq, John J. McPhaul, Paul J. Phillippi, and Roscoe R. Robinson. Jun 67, 18p
AMLC-TR-67-2

Descriptors: (*Proteins, Excretion), (*Kidneys, Diseases), Etiology, Histology, Biopsy, Urine, Transport properties, Capillaries, Diagnosis, Pathology.

Recent observations in patients with 'fixed and reproducible' orthostatic proteinuria suggest that earlier concepts regarding its etiology and prognosis may be incorrect. Patients with orthostatic proteinuria exhibit a renal hemodynamic response to standing which resembles that observed in normal subjects. The demonstration of histologic alterations of the glomeruli in a high percentage of renal biopsy specimens from young patients with 'fixed' orthostatic proteinuria has provided a reasonable primary explanation for this type of proteinuria. Other investigations suggest that the usual upright reduction of renal blood flow may 'permit' an increased trans-glomerular transfer of protein across the altered capillary wall. Follow-up observations on large numbers of young men with this condition at Wilford Hall USAF Hospital have shown that 'fixed and reproducible' orthostatic proteinuria is not always a transitory condition of adolescence and that it may reflect the existence of underlying mild renal parenchymal disease whose final clinical expression is still unknown. Subsequent five-year follow-up evaluation of these patients will clarify the current uncertainty regarding the long-term prognosis for patients with this disorder. (Author)
AD-656 690 HC$3.00 MF$0.65

HUMAN RENAL TRANSPLANTATION AT WILFORD HALL USAF HOSPITAL.
Final rept. Jun 65-Dec 66,
Wilford Hall Hospital (Air Force) Lackland AFB Tex
John J. McPhaul, Jr., James S. Harvin, and Jack R. Robinson. Aug 67, 21p
AMLC-TR-67-8

Descriptors: (*Kidneys, Transplantation), Immunity, Chemotherapy, Viability, Surgery.

Chronic renal disease accounts for a large number of deaths annually in the United States. Renal allografting may become a clinically applicable method of therapy, but it is still an investigative technique limited to use in large medical centers because of the extensive support required from medical and nursing personnel. A series of 22 allografts was performed in 20 patients at Wilford Hall USAF Hospital. The results demonstrated the feasibility of this approach in an Air Force clinical facility, long-range survival in 30 per cent of the transplanted patients, survival for six months in 50 per cent of the patients, and success with low-dose immunosuppressive therapy in the management of renal allografts. (Author)
AD-656 691 HC$3.00 MF$0.65

6F. Environmental Biology

ORAL INSECT REPELLENTS - INSECT TASTE RECEPTORS AND THEIR ACTION,
Alberta Univ Edmonton Dept of Entomology
Brian Hocking. 28 Jul 67, 3p
Grant DA-MD-49-193-63-G83

Descriptors: (*Culicidae, *Chemoreceptors), Insect repellents, Electrophysiology, Stimulation, Electrolytes (Physiology), Blood, Ingestion (Physiology), Reproduction (Physiology), Nutrition, Entomology, Aedes, Mouth.

The comparative study of the antennal chemoreceptors in the Culex pipiens complex showed that there is a progressive reduction in the numbers of long pointed receptors (AI) from fatigans (anthropophilic) through pipiens (ornithophilic) to molestus (autogenous). An electrophysiological investigation was made of the distal labral receptors of the mosquito Aedes aegypti. The work consisted mainly of developing a technique for stimulating these receptors and recording the resulting electrical phenomena.
AD-655 928 HC$3.00 MF$0.65

THE EFFECTS OF SOIL MICROORGANISMS ON THE PHYSICAL AND ELECTRICAL CHARACTERISTICS OF RADIO FREQUENCY CABLES,
Signal Corps Engineering Labs Fort Monmouth N J
For primary bibliographic entry see Field 11I.
AD-656 255 HC$3.00 MF$0.65

RODENT ATTACK ON RUBBER- AND PLASTIC-INSULATED WIRES AND CABLES,
Sieverts Kabelverk Ab Sundbyberg (Sweden)
For primary bibliographic entry see Field 9A.
AD-656 295 HC$3.00 MF$0.65

DEVELOPMENT OF AN ORALLY EFFECTIVE INSECT REPELLENT.
Quarterly progress rept. 1 May-31 Jul 67,
IIT Research Inst Chicago Ill

Philip Kashin. 31 Jul 67, 39p Rept no. IITRI-L6021-11
Contract DA-49-193-MD-2281
See also AD-651 281.

Descriptors: (*Insect repellents, Effectiveness), Test equipment, Bites + stings, Computer programs, Selection, Statistical analysis, Amino acids, Biological assay, Culicidae.
Identifiers: Aminobutyric acids, Oral insect repellents.

Fabrication of two additional bitometers was completed and the final calibration of these instruments was begun. A new computer program was developed that essentially incorporates all the desirable features of the old program. In addition, the new program gives a continuous estimate of how the repellency of test compounds differs from that of controls. Thus the data are handled much more efficiently. Work with the crayfish intestine preparation was continued in efforts to test the gamma-aminobutyric acid hypothesis in a physiological system.
AD-656 620 HC$3.00 MF$0.65

ENVIRONMENTAL FACTORS AND SANITATION OF SHELL EGGS WITH EMPHASIS ON THE MIDDLE EAST SITUATION.
Department of the Air Force New York 09224 Tuslog Detachment 36 (Usafe)
For primary bibliographic entry see Field 6H.
AD-656 773 HC$3.00 MF$0.65

RODENTS, THEIR ECTO-PARASITES AND ECOLOGY IN WESTERN TURKEY.
Department of the Air Force New York 09224 Tuslog Detachment 36 (Usafe)
For primary bibliographic entry see Field 6C.
AD-656 774 HC$3.00 MF$0.65

6G. Escape, Rescue, and Survival

CRASH SURVIVAL DESIGN GUIDE,
Aviation Safety Engineering and Research Phoenix Ariz
For primary bibliographic entry see Field 13L.
AD-656 621 HC$3.00 MF$0.65

FULL-SCALE FLIGHT TEST FROM SEA LEVEL OF AN ABORT-ESCAPE SYSTEM FOR A PROJECT MERCURY CAPSULE.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 18.
N67-31527 HC$3.00 MF$0.65

6H. Food

NEW APPROACHES TO MESS COOK MANAGEMENT AFLOAT.
Naval Personnel Program Support Activity, Washington, D. C. Personnel Research Lab.
For primary bibliographic entry see Field 5I.
AD-477 671 HC$3.00 MF$0.65

DETERMINATION OF AVAILABLE CARBOHYDRATES IN PLANT AND ANIMAL FOODS,
Colorado Univ Boulder Dept of Chemistry
Theodore E. Friedemann, Norman Witt, Bonnie W. Neighbors, and Charles W. Weber. 1 Jul 66, 45p
Grants PHS-GM-06451, PHS-AM-08374
Research supported in part by Army Medical Research and Nutrition Lab., Denver, Colo.
Availability: Published in Journal of Nutrition v91 Suppl2 n3 p1-40 Mar 1967.

Descriptors: (*Food, Carbohydrates), (*Carbohydrates, Chemical analysis), Nutrition, Polysaccharides, Starches, Hexoses, Volumetric analysis, Spectroscopy, Enzymes, Hydrolysis, Military rations.

The principal objectives of the paper are to present a choice of several simple and convenient chemical methods whereby the nutritionist may determine the available carbohydrate, either in a single analysis of the sample, or in separate assays of the soluble sugars and starch; to suggest improved methods for calculating the total available hexose or carbohydrate, and their calorie equivalents, from the raw titration or spectrophotometric data; to relate the ACho to the crude carbohydrate, nitrogen-free extract, and the digestibility coefficient.
AD-656 351 Not available from CFSTI.

NUTRITION SURVEY FORT HUACHUCA, ARIZONA MARCH-APRIL 1966,
Army Medical Research and Nutrition Lab Denver Colo Bioenergetics Div
C. Frank Consolazio, LeRoy O. Matoush, Herman L. Johnson, Richard A. Nelson, and Harry J. Krzywicki. Apr 67, 43p
USAMRNL-309

Descriptors: (*Military personnel, *Nutrition), Military rations, Food, Diet, Body weight, Ingestion (Physiology), Army personnel, Physical fitness.

Food intakes were measured in three military units (men) and in one WAC Company at Fort Huachuca, Arizona. Total food intakes averaged 3881, 3886, and 3731 Calories/day for the three groups of men and 2846 Calories/day for the WAC Company. These intakes were considerably above the minimal allowances prescribed in AR 40-5. The edible waste averaged 15.3, 13.5, and 9.3% for the three groups of males and 21.9% for the WAC Company. (Author)
AD-656 463 HC$3.00 MF$0.65

APPLICATIONS OF MICROWAVE HEATING TO FOOD PROCESSING AND COOKERY: A CHECKLIST BIBLIOGRAPHY,
Army Natick Labs Mass Technical Library
Eugene G. Beary. Feb 67, 29p Rept no. Bibliographic-67-2

Descriptors: (*Food, Processing), Heating, Microwaves, Patents, Dielectric properties, Bibliographies, Preservation, Preparation.

The checklist bibliography contains 218 references to the literature on both the dielectric (under 100 megacycles) and the microwave (900 to 3,000 megacycles) ranges of heating as they apply to food processing and cookery. References to the production of microwaves and to types of microwave equipment were included to a lesser extent. The time coverage is 1942 to November 1966. (Author)
AD-656 741 HC$3.00 MF$0.65

ENVIRONMENTAL FACTORS AND SANITATION OF SHELL EGGS WITH EMPHASIS ON THE MIDDLE EAST SITUATION.
Professional rept.,
Department of the Air Force New York 09224 Tuslog Detachment 36 (Usafe)
Robert P. Juni. 10 Feb 67, 24p Rept no. Det-36-67-1

Descriptors: (*Eggs, Biological contamination), Salmonella, Diseases, Food, Sanitary engineering, Hygiene, Humans, Epidemiology, Infectious diseases, Quality control, Middle East, Procurement, Military requirements.

The mechanisms by which shell eggs can become infected and transmit enteric disease to humans are reviewed. Some data are presented which show the environmental conditions in the Middle East which cause contamination of shell egg contents along with results of some bacteriological examinations. Problems of sanitation are identified with the expansion of consumer markets without a corresponding advancement in the industrial and sociological base. The sanitation of egg-washing is discussed in some detail. A program is suggested for U. S. Forces to obtain a reasonably sanitary product in areas with primitive egg-marketing practices. Bacteriological results support the conclusion that shell eggs coming through the common marketing channels have greater contamination than those obtained directly from the farm. A quality control program and sanitary guide is appended. (Author)
AD-656 773 HC$3.00 MF$0.65

A STUDY TO INVESTIGATE THE FEASIBILITY OF THE EXPANSION AND DIVERSIFICATION OF INTEGRATED CATTLE FEEDING AND BEEF PRODUCTION ON THE GILA RIVER INDIAN RESERVATION NEAR PHOENIX, ARIZONA.
Engineering-Science, Inc., Arcada, Calif.
For primary bibliographic entry see Field 2B.
PB-175 704 HC$3.00 MF$0.65

THE EFFECT OF REPEATED TREATMENT WITH GAMMA RAYS ON THE RADIO-RESISTANLATED BACTERIA,
Massachusetts Inst. of Tech., Cambridge. Dept. of Nutrition and Food Science.
J. J. Licciardello, J. T. R. Nickerson, and S. A. Goldblith. Feb 67, 57p
Contract AT (30-1)-3325

Descriptors: (*Bacteria, *Gamma rays), (*Salmonella, Culture media), Radiation effects, Storage, Mutations.

For abstract, see NSA 21 15.
TID-23707 HC$3.00 MF$0.65

6K. Life Support

ELECTROCHEMICAL CARBON DIOXIDE SENSOR.
Final rept. Oct 65-Oct 66,
Ionics Inc Watertown Mass
Frank B. Leitz. May 67, 55p
AMRL-TR-66-237
Contract AF 33 (615)-3261

Descriptors: (*Gas analysis, Instrumentation), (*Carbon dioxide, Sensors), Electrochemistry, Ion exchange resins, Resistance (Electrical), Bases (Chemistry), Ionization, Membranes, Concentration (Chemistry).

The purpose of the program was to develop a novel carbon dioxide sensor based on obtaining changes in the electrical resistance of anion-exchange resin proportional to the ambient partial pressure of carbon dioxide. The change in resistance is due to the increased ionization of a weakly ionized base in the presence of a sightly acid gas. A laboratory program was conducted to evaluate the response of various types of weak-base ion-exchange polymers to carbon dioxide concentrations in the range of 0 to 4%. The optimum material consisted of a condensation polymer of resorcinol, formaldehyde and triethylenetetramine. A laboratory model of the CO2 Sensor was fabricated using these sensing elements in the form of small, thin strips. In order to minimize the effects of humidity and temperature, the model contained two sensing elements, one being a reference. A guard chamber was provided to absorb any strongly-acid gases. Electrical readout is made on a balancing potentiometer with an earphone detector. The Sensor is small (about 50 cubic inches), weighs less than 6 ounces, has a power requirement of less

than 0.5 watts, and its operation is independent of gravity. (Author)
AD-655 936 HC$3.00 MF$0.65

INVESTIGATION OF AN INTEGRATED CARBON DIOXIDE-REDUCTION AND WATER-ELECTROLYSIS SYSTEM.
Final technical rept. 1 Jan 65-30 Jun 66,
Battelle Memorial Inst Columbus Ohio Columbus Labs
John E. Clifford, Edwin S. Kolic, Edward W. Winter, Robert H. Cherry, and Eugene J. Mezey. Apr 67, 74p
AMRL-TR-66-186
Contract AF 33 (615)-2288

Descriptors: (*Oxygen equipment, Electrolytic cells), (*Carbon dioxide, Reduction (Chemistry)), (*Water vapor, Electrolysis), Cathodes (Electrolytic cell), Palladium alloys, Silver alloys, Catalysts, Ruthenium, Nickel, Methane, Decomposition, Closed ecological systems.

A new integrated system for oxygen recovery from carbon dioxide was investigated. Experimental studies indicated that it was feasible to integrate water electrolysis with carbon dioxide hydrogenation in an electrolysis cell using Pd-25Ag hydrogen-diffusion cathodes containing Sabatier catalyst. A closed system producing carbon appeared feasible from experiments on catalytic methane cracking followed by hydrogen separation from unreacted methane in an electrolytic hydrogen-concentration cell using Pd-25Ag electrodes. A small experimental breadboard system was designed and constructed. (Author)
AD-655 937 HC$3.00 MF$0.65

OIL CONTAMINATION IN OXYGEN SYSTEMS.
General Dynamics Corp Groton Conn Electric Boat Div
For primary bibliographic entry see Field 13L.
AD-656 126 HC$3.00 MF$0.65

INTEGRATED LIFE SUPPORT SYSTEM STUDY (20-DAY EVALUATION PROGRAM).
Final rept. Apr-Dec 65,
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
Courtney A. Metzger, and Eugene Fritz. Dec 66, 76p Rept no. AMRL-TR-66-185

Descriptors: (*Life support, Performance (Engineering)), Man-machine systems, Maintenance, Respiration, Pressure suits, Space medicine, Water, Recovery, Hygiene, Wastes (Sanitary engineering), Nutrition, Instrumentation, Strength, Spacecraft cabins, Closed ecological systems, Muscles, Space simulation chambers.

Tests were conducted to define the various problems involved in the maintenance of an acceptable environment, the number of variables concerned with the man-machine concept, the operation, maintenance and evaluation of single units and integrated systems for the support of life in a simulated aerospace mission. The investigation covered primary problems and benefits associated with water recovery, personal hygiene, sanitation, nutrition, instrumentation, atmospheric conditions at various pressures and mixtures, clothing, crew accommodations, waste management and muscle-strength while confined in a chamber simulating an aerospace vehicle, and the facilities and support required to test and evaluate life support systems. (Author)
AD-656 311 HC$3.00 MF$0.65

RESEARCH ON OXYGEN TOXICITY AT THE CELLULAR LEVEL.
IIT Research Inst Chicago Ill
For primary bibliographic entry see Field 6T.
AD-656 495 HC$3.00 MF$0.65

IMMOBILIZED LIQUID MEMBRANES FOR CONTINUOUS CARBON DIOXIDE REMOVAL.
Final rept. Jul 65-Jun 66,
General Electric Co Schenectady N Y Research and Development Center
W. J. Ward, III. Jun 67, 49p Rept no. S-67-1076
AMRL-TR-67-53
Contract AF 33 (615)-2957

Descriptors: (*Controlled atmospheres, Purification), (*Carbon dioxide, Removal), Oxygen equipment, Separation, Membranes, Water, Films, Porous materials, Cellulose acetates, Oxygen, Transport properties, Cesium compounds, Carbonates, Hydrolysis, Catalysts, Permeability.

The objective of the program was the development of an immobilized liquid membrane for CO2 removal from a manned spacecraft. During basic film research, water was found to be better than a polymeric material or any pure liquid for CO2/O2 separation. An immobilized film of water was available in the form of a porous cellulose acetate membrane. By impregnating this membrane with a concentrated solution of CsHCO3/Cs2CO3, and a catalyst for the hydrolysis of CO2, CO2 transport was facilitated and O2 transport was decreased to obtain a CO2/O2 separation factor and CO2 permeability of 4100 and 55, 796 x 10 to the -9th power. A mathematical analysis of CO2 transport was also carried out. It will now be possible to build a single-stage CO2 removal system with minimum power, weight, and size requirements. (Author)
AD-656 785 HC$3.00 MF$0.65

REGENERATIVE CARBON DIOXIDE ADSORPTION SYSTEM USING CHARCOAL.
Final rept. 1 Apr 65-30 Sep 66,
Bendix Corp Davenport Iowa Instruments and Life Support Div
Peter Wildermuth. May 67, 53p
AMRL-TR-67-48
Contract AF 33 (615)-2443

Descriptors: (*Controlled atmospheres, Purification), (*Carbon dioxide, Adsorption), (*Charcoal, Adsorption), Test equipment, Oxygen, Water vapor, Separation, Vacuum apparatus, Gas flow.

A system was designed and built for testing activated charcoal as a regenerative carbon dioxide adsorbent in an atmosphere involving oxygen pressures of 240-275 mm Hg. The system gas flow rate was 160-340 liters/minute. The gas stream was composed of oxygen, humidified to 50%. Carbon dioxide was added to simulate the production rate of two men. Because of the sub-atmospheric operation, the system was a closed loop design and any carbon dioxide not adsorbed on the first pass through the charcoal continued to circulate through the system. The charcoal was subjected to an ambient room temperature of approximately 27C, and the gas stream controlled at 26.7 plus or minus 2.7C during the adsorption testing. Regeneration of the charcoal was by vacuum. The testing program demonstrated that charcoal will continue to adsorb carbon dioxide at a significant rate after repeated cycling with no apparent change or degradation. The presence of water vapor in the gas stream tends to reduce the capacity of the charcoal for adsorbing carbon dioxide. However, it is readily removed from the charcoal by vacuum and exhibits no cumulative effect on the carbon dioxide adsorptive capacity of the charcoal. (Author)
AD-656 786 HC$3.00 MF$0.65

6L. Medical and Hospital Equipment

DIRECT COLOR RADIOGRAPHY,
Army Medical Research Lab., Fort Knox, Ky.
J. C. Shepard, and R. M. Young. 6 Jun 58, 15p Rept. no. 315A
Rept. on True Color Radiography.

Descriptors: (*Radiographic film, Color film), X-ray photography, Diagnosis, Medical equipment.

A direct roentgenographic method has been developed to produce under normal diagnostic conditions and with normal exposure times color radiographs with high resolution and good definition. The method uses only commercially available materials and is characterized by ease, speed, and inexpensiveness. (Author)
AD-203 577 HC$3.00 MF$0.65

A SIMPLE COLLAR DEVICE FOR THE PROTECTION OF SKIN GRAFTS IN MICE,
Walter Reed Army Inst of Research Washington D C
Albert Einheber, Robert E. Wren, Darryl Carter, and Lawrence R. Rose. 1967, 5p
Availability: Published in Laboratory Animal Care v17 n3 p345-8 1967.

Descriptors: (*Transplantation, Shielding), Germfree animals, Mice, Safety devices, Laboratory equipment, Laboratory animals.

A simple, easily mounted cellulose acetate collar is described which effectively prevents the mouse from disturbing skin grafts on its back. It is reliable and reusuable, greatly facilitating skin grafting procedures within germfree isolators and minimizing technical failure. It may find application for other types of experimental wounds, e.g., burns and skin incisions, and other situations where such shielding may be desirable. (Author)
AD-655 942 Not available from CFSTI.

DETERMINATION OF ETHYLENE OXIDE IN STERILIZED CATHETERS BY GAS-LIQUID CHROMATOGRAPHY,
Walter Reed Army Medical Center Washington D C
For primary bibliographic entry see Field 6A.
AD-656 213 HC$3.00 MF$0.65

SCAN RECORDING AND RESCAN IN COLOR.
Final rept. 17 May 66-16 May 67,
Chiba Univ (Japan) School of Medicine
Hirotake Kakehi. Jun 67, 14p
ARDG (FE)-J-250-4
Contract DA-92-557-FEC-38117

Descriptors: (*Color television, Diagnosis), Medical equipment, Medical examination, Scanning, Brightness, Closed circuit television, Brain, Liver, Pancreas, Neoplasms, Japan.

With some improvements of the former color television system which helps enhancing the contrast in conventional scans, a new model was devised. Clinical applications were performed with this equipment. As the result, the rescans of high fidelity were obtained in a short time and the apparatus was of great use in checking the scans routinely. (Author)
AD-656 530 HC$3.00 MF$0.65

ORIENTOMETER-A MULTI-DIRECTIONAL TREADMILL FOR THE ANALYSIS OF ORIENTATION,
Harvard Univ., Cambridge. Dept. of Biology.
William B. Kerfoot. 1967, 3p
Research supported in part by NSF.

Descriptors: (*Laboratory equipment, Biological laboratories), Insects, Motion, Measurement, Recording systems.

The orientometer consists of three separate parts: (a) the platform on which the insect moves; (b) the translator, which transforms the movements of the platform into electrical signals; and (c) the operation recorder, which leaves a pen and ink re-

cording on a moving paper chart. The platform, consists of a table tennis ball supported by three ball-point pen points. The insect is placed on top of the table tennis ball while being held securely by a strip of tape on the head of a pin. The shaft of the pin is inserted into a glass tube, allowing the insect to swivel in any direction while it is running on top of the ball.
PB-175 625 HC$3.00 MF$0.65

NIAID MOLECULAR ANATOMY PROGRAM.
Semiannual contract progress rept for 1 Sep 66-28 Feb 67,
Oak Ridge National Lab., Tenn.
Norman C. Anderson, G. B. Cline, and W. W. Harris. 28 Feb 67, 5p

Descriptors: (*Centrifuges, Design), (*Electron microscopy, *Counting methods), Biological laboratories, Laboratory equipment, Viruses, Particles, Performance (Engineering).

A prototype K-11 centrifuge rotor was used for dynamic stability studies, for seal development, and for orienting studies with influenza virus particles using 20-30 liter batches of chorioallantoic fluid in collaboration with Eli Lilly and Co. The rotor was tested to destruction, and as a result of these studies a number of design changes were recommended. Studies on flow rate vs. cleanout with this rotor indicated that at 27,000 rpm the recovery of the virus from the flowing stream was essentially complete up to a flow rate of 18 liters per hour. Studies were also directed toward increasing the sensitivity of electron microscope particle-counting techniques. A series of experiments with inverted-cone tubes showed that nylon tubes were satisfactory for repeated use. (Author)
PB-175 643 HC$3.00 MF$0.65

6M. Microbiology

DIFFERENTIATION, CLASSIFICATION AND LABORATORY DIAGNOSIS OF EL TOR VIBRIOS.
Final rept. 15 Mar 66-14 Mar 67,
Kyushu Univ Fukuoka (Japan) Dept of Bacteriology
Kenji Takeya. Apr 67, 29p
ARDG (FE)-J-231
Contract DA-92-557-FEC-37969
Availability: Microfiche only after original copies exhausted.

Descriptors: (*Vibrio, Classification), Cholera, Epidemiology, Bacteriophages, Fluorescent antibody techniques, Electron microscopy, Japan.
Identifiers: El Tor vibrios.

By the use of kappa-type phage, El Tor cholera vibrios were classified into 'Celebes type' and 'Classic-Ubon type', and the 'Celebes type' was further divided into 'Original' and 'Cured' strains. This phage-typing was applied to epidemiological studies. Biologic properties of 'Cured' strains and properties of phages liberated from Inaba type El Tor cholera vibrios and some Asiatic cholera vibrios were clarified. The kappa-type phage could be liberated from spheroplast form of Celebes type El Tor cholera vibrios cells, and its significance was discussed in relation to the detection of long-term carriers. Successful results of the application of phage detection method to carrier studies were described, and furthermore, a new phage-enrichment method for detection of long-term carriers was devised. The fluorescent antibody stainability of flagellum of El Tor cholera vibrio after heating or trichloracetic acid treatment was examined. (Author)
AD-655 898 HC$3.00 MF$0.65

LARGE-VOLUME AIR SAMPLING OF HUMAN RESPIRATORY DISEASE PATHOGENS,
Walter Reed Army Inst of Research Washington D C
Malcolm S. Artenstein, William S. Miller, James H. Rust, Jr., and Thomas H. Lamson. 21 Sep 66, 8p
Availability: Published in American Journal of Epidemiology v85 n3 p479-85 1967.

Descriptors: (*Adenoviruses, Aerosols), (*Neisseria meningitidis, Bacterial aerosols), (*Aerosols, *Respiratory diseases), Sampling, Epidemiology, Samplers, Air.

Air sampling of natural aerosols was performed in an Army recruit camp during a period when acute respiratory disease was epidemic. The large-volume instrument used sampled 10,000 liters (354 cubic feet) of air per minute. Testing of individual ill recruits in a hospital room yielded ten aerosols positive for adenovirus type 4 from thirteen recruits with adenovirus in throat secretions. Of fourteen recruits found to be nasopharyngeal carriers of N. meningitidis, four aerosols were positive for this same organism. Adenovirus concentrations in aerosols ranged from one viral unit per 204 cubic feet to one unit in 1970 cubic feet. Meningococci were found in a concentration of one colony forming particle per 99 to 238 cubic feet of air. Comparison of concentration of organisms in positive air samples with throat gargles or cough plates from the same patients did not show a high degree of correlation. Aerosolized virus was recovered in several types of barracks during some periods of occupancy. (Author)
AD-655 940 Not available from CFSTI.

ISOLATION OF BACTERIOPHAGES ACTIVE AGAINST NEISSERIA MENINGITIDIS,
Walter Reed Army Inst of Research Washington D C
Sylvia G. Cary, and Donald H. Hunter. 17 Feb 67, 6p
Availability: Published in Journal of Virology v1 n3 p538-42 Jun 1967.

Descriptors: (*Neisseria meningitidis, *Bacteriophages), Growth, Culture media, Classification, Separation, Immune serums.

Five distinct bacteriophages have been isolated from strains of Neisseria meningitidis. Filtrates with titers of .0001 to .000001 were produced with a modified Swanstrom and Adams semisolid agar procedure, employing Eugonbroth with added agar and an incubation temperature of 30 C. Of 49 strains of N. meningitidis (groups B and C), 25 were lysed by one or more of the phages, but there was no lysis of other Neisseria and Mima polymorpha strains. (Author)
AD-655 941 Not available from CFSTI.

FIELD TRIAL OF A MONOVALENT AND OF A BIVALENT MINERAL OIL ADJUVANT TRACHOMA VACCINE IN TAIWAN SCHOOL CHILDREN,
Washington Univ Seattle Dept of Preventive Medicine
For primary bibliographic entry see Field 6E.
AD-656 297 Not available from CFSTI.

LONG-TERM FOLLOW-UP OF THE INITIAL (1959-1960) TRACHOMA VACCINE FIELD TRIAL ON TAIWAN,
Washington Univ Seattle Dept of Preventive Medicine
For primary bibliographic entry see Field 6E.
AD-656 299 Not available from CFSTI.

MYCOPLASMA PNEUMONIAE: COMPLEMENT-FIXING ANTIBODY TITERS AT BIRTH,
Army Medical Research and Nutrition Lab Denver Colo
For primary bibliographic entry see Field 6E.
AD-656 362 Not available from CFSTI.

EXTRACELLULAR POLYSACCHARIDES OF YEAST,
National Research Council of Canada Saskatoon (Saskatchewan) Prairie Regional Lab
For primary bibliographic entry see Field 6A.
AD-656 544 Not available from CFSTI.

NIAID MOLECULAR ANATOMY PROGRAM.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 6L.
PB-175 643 HC$3.00 MF$0.65

RESEARCH AND DEVELOPMENT OF ATTENUATED AND INACTIVATED RUBELLA VACCINES.
Semiannual contract progress rept. 1 Sep 66-1 Mar 67,
Abbott Labs., North Chicago, Ill.
Jacob C. Holper. 1 Mar 67, 41p
Contract PH-43-66-459

Descriptors: (*Rubella, *Vaccines), Tissue culture, Growth, Tissue culture cells, Freeze drying, Stability, pH, Purification, Immune serums, Attenuation, Preparation.

Rubella virus pools suitable for vaccine tests in man were prepared using HPV-77 as starting seed and further passaged in bovine kidney cells at 30 and 34 C. Rubella virus was also passaged in duck embryo and chick embryo cells. HPV-77 and RV were readily adapted to growth at 26 C in BK cells. Rubella virus was relatively stable to repeated cycles of freezing and thawing. Stability of aqueous and lyophilized virus at various temperatures was reported. Infectivity of rubella virus was acid labile and appeared to be more stable at neutral or slightly alkaline pH. An interference test with rubella virus in BK cells was developed and found to give comparable titers to those obtained with the AGMK-Coxsackie interference system. Rubella virus was concentrated by centrifugation and further purified by density gradient separation in the zonal ultracentrifuge. Results indicate that rubella virus may be separated from media serum components by density gradient centrifugation. Methods of producing HA antigen from BHK cells were studied. High titered antisera to rubella virus was produced in monkeys, rabbits and a horse. The latter sera has been supplied to several other pharmaceutical houses for tissue culture control testing. Studies with formalin, UV and BPL inactivated virus were reported. The ferret appears to be highly sensitive to recovery of low concentrations of live virus in inactivated samples of rubella virus. (Author)
PB-175 645 HC$3.00 MF$0.65

6O. Pharmacology

THE TREATMENT OF SCOPOLAMINE-INDUCED DELIRIUM WITH PHYSOSTIGMINE.
Technical rept.,
Edgewood Arsenal Md
Edward B. Crowell, Jr, and James S. Ketchum.
Jul 67, 18p Rept no. EA-TR-4115

Descriptors: (*Physostigmine, Pharmacology), (*Scopolamine, Detoxification), Illusions, Chemotherapeutic agents, Parasympatholytic agents, Cholinesterase inhibitors, Humans, Central nervous system.
Identifiers: Antidotes.

A study was made of the effect of physostigmine treatment of scopolamine-induced delirium. Thirty-three normal male volunteers were divided into four groups and given 24 micrograms/kg of scopolamine hydrobromide intramuscularly, after which serial physiologic and quantitative mental-function studies were done. Maximum scopolamine-induced delirium was seen 90 min after injection. One group served as controls and received no ther-

apy. The other three groups were treated with 50 micrograms/kg of physostigmine salicylate im, one group each at 15, 30, and 90 min after scopolamine administration. The group treated at 90 min improved considerably, whereas the groups treated at 30 and 15 min showed respectively less improvement. It is concluded that physostigmine reverses the delirium produced by scopolamine in humans after it has occurred but is less capable of preventing its onset. Physostigmine, carefully employed, is recommended as an antidote in cases of accidental overdosage of anticholinergic drugs. (Author)
AD-655 855 HC$3.00 MF$0.65

FAILURE OF TRACHOMA TREATMENT WITH OPHTHALMIC ANTIBIOTICS AND SYSTEMIC SULFONAMIDES USED ALONE OR IN COMBINATION WITH TRACHOMA VACCINE,
Washington Univ Seattle Dept of Preventive Medicine
For primary bibliographic entry see Field 6E.
AD-656 300 Not available from CFSTI.

CORTICOID THERAPY FOR PRETIBIAL MYXEDEMA. OBSERVATIONS ON THE LONG-ACTING THYROID STIMULATOR.
Clinical Investigation Center Oakland Calif
For primary bibliographic entry see Field 6E.
AD-656 554 Not available from CFSTI.

FEEDING THROUGH THE SKIN WITH DIMETHYL SULFOXIDE.
Dartmouth Coll Hanover N H Wilder Lab
For primary bibliographic entry see Field 6E.
AD-656 687 HC$3.00 MF$0.65

6P. Physiology

NEUROPHYSIOLOGICAL STUDIES ON THE OLFACTORY RECEPTIVE MECHANISM.
Final rept. no. 1, 21 Jan 66-20 Jan 67,
Gunma Univ Maebashi (Japan)
Sadayuki F. Takagi. Apr 67, 36p
ARDG (FE)-J-271-1
Grant DA-CRD-AG-S92-544-66-G34

Descriptors: (*Smell, Chemoreceptors), (*Chemoreceptors, Electrophysiology), Nervous system, Ions, Odors, Electron microscopy, Electrolytes (Physiology), Permeability, Physiology, Japan.
Identifiers: Electro-olfactography.

Ionic mechanism of the negative receptor potentials (EOG) was studied in the olfactory epithelium of the frog by substituting Na (+) in bathing Ringer's solution with other ions or chemicals, or by increasing or decreasing K (+) or Ca (++) in the solution. It was found that any of sucrose, Li (+), choline (+), tetraethyl ammonium (+) (TEA) and hydrazine can not replace Na (+) in maintaining the EOGs. When Na (+) and K (+) in Ringer's solution were reversed, the negative EOGs reversed their polarity. Then, the reversed EOGs showed a complete or nearly complete recovery only in normal (Na (+)) Ringer's solution but never in the other solutions. Thus, essential role of Na (+) was proved. In K (+)-free Ringer's solution, the negative EOGs decreased in amplitude after an initial increase. In K (+)-excess Ringer's solution, the EOGs increased in amplitude. Thus, contribution of K (+) to the negative EOGs was proved. Contribution of Cl (-) to the EOGs was ruled out by the selectively depresent action of Ba on the Cl (-) permeability. It is concluded that the negative EOGs are elicited by increase in permeability of the olfactory receptive membrane to Na (+) and K (+), but not to Cl (-). (Author)
AD-655 897 HC$3.00 MF$0.65

GENESIS OF ACTION POTENTIALS IN EXCITABLE TISSUES.
Final scientific rept. 1 May 66-30 Apr 67,
Uppsala Univ (Sweden) Inst of Physiology and Medical Biophysics
Torsten Teorell. 30 May 67, 18p
AFOSR-67-1693
Grant AF-EOAR-5-66

Descriptors: (*Membranes (Biology), Electrophysiology), Semipermeability, Ions, Hydrostatic pressure, Thresholds (Physiology), Mathematical models, Biophysics, Nerve cells, Heart, Arrhythmia, Water, Transport properties, Cells (Biology), Dextran, Gels, Nerves, Sweden.

The work was concerned with the nature of the possible coupling between electrochemical and hydrostatic forces in excitable cell membranes and on the nature of selectivity properties of gel polymer cell models. (1) A model for mechanoelectrical transduction was investigated on the electrohydraulic nerve analog. The problems were centered on the definition of the 'threshold' concepts. By means of analog computation and methods from non-linear mechanics a certain clarification was obtained in terms of the electrical stimulus intensity, the prevailing hydrostatic membrane pressure differential and the time history of the system. The difference in the effects of suprathreshold and subthreshold stimuli was elucidated. These studies may be of importance in a future analysis of the behavior of biological mechanoreceptors and for the understanding of the pacemaker action in the heart in normal and arrhythmical conditions. (2) Studies on living objects were performed on isolated frog hearts, demonstrating that the mechanical distension may be of importance for the heart excitability, indicating a possible coupling between electrochemical and pressure forces. Excitability theories predict also a water transfer across the excitable membranes during excitation. Experiments on the isolated crayfish axons showed the possibility of a marked water transfer. (3) In order to elucidate the nature of the differential, selective ion permeability properties, characteristic for living cell membranes, some preliminary work was done on 'parametric ion pumping' on artificial membranes. (4) An extensive report was made on the selectivity properties of ions and non-electrolytes in gel polymers. (Author)
AD-655 902 HC$3.00 MF$0.65

VASOPRESSIN, ITS BIOASSAY AND THE PHYSIOLOGICAL CONTROL OF ITS RELEASE,
Western Reserve Univ Cleveland Ohio Dept of Physiology
Leonard Share. 1967, 15p
AFOSR-67-1721
Grants AF-AFOSR-692-65, PHS-HE-06035
Availability: Published in The American Journal of Medicine v42 n5 p701-12 May 1967.

Descriptors: (*Pituitary hormones, Biological assay), Secretion, Blood volume, Dosage, Blood plasma, Hemorrhage, Cardiovascular system, Reviews.
Identifiers: Antidiuretic hormone.

The review covers the following topics: (1) The extraction of vasopressin from blood; (2) the bioassay of vasopressin; and (3) the physiological control of the release of vasopressin from the neurohypophysis, with particular emphasis on the role of changes in blood volume. (Author)
AD-655 973 Not available from CFSTI.

VITAMIN C REQUIREMENTS IN STRESS,
Army Medical Research and Nutrition Lab Denver Colo
Eugene M. Baker. 1967, 9p
Availability: Published in American Journal of Clinical Nutrition v20 n6 p583-90 1967.

Descriptors: (*Ascorbic acid, Metabolism), Nutrition, Stress (Physiology), Deficiency diseases, Healing, Dosage, Pregnancy, Coenzymes, Labeled substances, Acclimatization.

A discussion is presented of the following: (1) Effect of higher intakes of Vitamin C; Vitamin C requirements under stress; Vitamin C requirements in pregnancy; Evaluation of methods to determine Vitamin C requirement; Summation of the results obtained from isotope studies; Ascorbic acid - a coenzyme.
AD-656 350 Not available from CFSTI.

BIOCHEMICAL ALTERATIONS IN THIAMINE DEFICIENCY -- THEIR INTERPRETATION,
Army Medical Research and Nutrition Lab Denver Colo
H. E. Sauberlich. 1967, 16p
Availability: Published in American Journal of Clinical Nutrition v20 n6 p528-42 1967.

Descriptors: (*Thiamines, Deficiency diseases), Nutrition, Enzymes, Oxygen consumption, Coenzymes, Metabolism, Excretion, Alkyl transferases, Blood chemistry, Diet.

In evaluating thiamine nutritional states, it would appear justified to determine, whenever feasible, not only thiamine excretion in the urine, but also erythrocyte transketolase activity. Determination of an appropriate thiamine-dependent enzyme system reflects the metabolism of the vitamin at the cellular and molecular level. Urinary thiamine levels can provide information as to the adequacy of the dietary intakes, but do not necessarily evaluate accurately a marginal deficiency. Determinations for pyruvic acid and other metabolites in blood or urine can provide evidence of a thiamine insufficiency, particularly when clinical signs are evident. Determinations of free thiamine in plasma do not necessarily reflect a direct relationship to the level in the blood and tissues. Erythrocyte or leukocyte thiamine values apparently show a more direct relationship to tissue content. It is for this reason that erythrocyte transketolase activity appears to provide information as to tissue reserves of thiamine and reflects a direct functional evaluation at the cellular level.
AD-656 360 Not available from CFSTI.

FASTING PLASMA AMINO ACIDS AND NITROGEN RETENTION IN MAN FOLLOWING PROLONGED SUPPLEMENTATION WITH WHEAT GLUTEN OR EGG WHITES,
Army Medical Research and Nutrition Lab Denver Colo
Robert A. Levine, Richard S. Harding, Gerhard J. Isaac, Esther T. Bongiovanni, and Calra L. Miller. 1967, 7p
Availability: Published in American Journal of Clinical Nutrition v20 n5 p404-9 1967.

Descriptors: (*Proteins, Ingestion (Physiology)), Gluten, Eggs, Wheat, Diet, Amino acids, Blood chemistry, Nitrogen, Blood plasma, Glutamic acid, Etiology, Deficiency diseases.

Prolonged and excessive gluten or egg white administration in 17 volunteer subjects resulted in significant elevations of the fasting free glutamic acid and lesser rises in the proline concentration of the plasma. Changes in other amino acids were not significant. High gluten diets produced greater nitrogen utilization than diets supplemented with egg whites. In no case was the mean coefficient of digestibility for lipid, protein, or carbohydrate influenced by the prolonged dietary protein supplementation. The findings support the concept that plasma amino acid concentration, under the conditions of this study, may be dependent upon and qualitatively reflect the amino acid composition of the ingested protein after prolonged supplementation. These data, further suggest that elevation in fasting free plasma glutamic acid per se does not have a deleterious effect and therefore may not be of etiologic importance in the pathogenesis of nontropical sprue. (Author)
AD-656 361 Not available from CFSTI.

ENERGY, NITROGEN, AND WATER REQUIREMENTS OF NORMAL ADULTS RESIDING AT 4300 METERS FOR 28 DAYS,
Army Medical Research and Nutrition Lab Denver Colo Bioenergetics Div
C. Frank Consolazio, LeRoy O. Matoush, Herman Johnson, and Ted A. Daws. Jul 67, 27p
USAMRNL-308

Descriptors: (*Nutrition, High altitude), (*Acclimatization, Nutrition), Energy, Nitrogen, Water, Food, Ingestion (Physiology), Exercise, Physical fitness, Dehydration, Stress (Physiology).

Balance studies were conducted on three groups of young, healthy adults between the ages of 18-24 years. After control studies, Group I was taken to 4300 meters gradually, Group II was taken to 4300 meters abruptly, and Group III remained at sea level during the entire study. One-half of each group were physically conditioned. No significant differences were observed in nitrogen, and fluid balances between: (a) the groups that were taken to altitude gradually or abruptly, or (b) between the groups that were physically conditioned, and those who did not exercise. As a result, the respective groups were combined for comparative purposes. Three factors were prominent during the 28 day high altitude exposure to 4300 meters that included: (a) a decrease in food intake which is probably due to anorexia caused by the clinical symptoms; (b) a negative nitrogen balance which may be due to the decreased nutrient intake and the increased requirement for energy; and (c) a negative fluid balance due to involuntary dehydration and other undetermined factors. These factors appeared to be somewhat less in Group I who ascended to altitude gradually, and suggests the beneficial effects of ascending to high altitude gradually. (Author)
AD-656 462 HC$3.00 MF$0.65

NUTRITION SURVEY, FORT HUACHUCA, ARIZONA MARCH-APRIL 1966,
Army Medical Research and Nutrition Lab Denver Colo Bioenergetics Div
For primary bibliographic entry see Field 6H.
AD-656 463 HC$3.00 MF$0.65

CONTROLLING A LETHAL GROWTH PROCESS,
Purdue Univ Lafayette Ind Dept of Statistics
Marcel F. Neuts. Jun 67, 25p Rept no. Mimeograph Ser-111
Contract Nonr-1100 (26)

Descriptors: (*Biometry, Growth), (*Growth, Mathematical models), (*Life expectancy, Optimization), Control, Particles, Radiotherapy, Chemotherapy, Scheduling, Probability, Statistical analysis.

A host carries a lethal growth of size N at time t = o. The growth increases according to a Yule-Furry process and the mortality rate of the host due to the growth is assumed to be proportional to the number of particles in the growth. Periodically the host is given treatment which removes particles from the growth according to a Bernoulli sampling scheme with probability p. The treatment itself has a certain lethality, which we assume to be an increasing function of p. Moreover the mortality rate of the host increases by a term which is proportional to the number of treatments already received and depends on their intensity (p). The problem of choosing the spacing and intensity of the treatments, so as to maximize the probability of survival of the host is an interval of time, or the expected survival time, is discussed. (Author)
AD-656 484 HC$3.00 MF$0.65

EFFECT OF HIGH ALTITUDE TO HEMATOPOIETIC PROCESS.
Final rept. no. 2, 1 Mar 66-28 Feb 67,
Toho Univ Tokyo (Japan) School of Medicine
Kazuo Asahina. May 67, 41p
ARDG (FE)-J-234-4
Contract DA-92-557-FEC-37964

Descriptors: (*Blood circulation, High altitude), (*Acclimatization, Performance (Human)), Tolerances (Physiology), Endurance, Heart, Stress (Physiology), Lungs, Cardiovascular system, Ascorbic acid, Hypoxia, Humans, Rabbits, Rats, Japan.

Changes in stroke volume of the right and left heart were studied in relation to tolerance to altitude. It was concluded that the pulmonary circulation might be regarded as a limiting factor of importance for performance at altitude. Chronic experiments on rabbits with chronic implanted heart electrodes were performed with partial success. The animals can be kept alive about one month after the operation. The results of these chronic experiments showed that the contractile capacity of the right heart is strengthened, increasing the right heart stroke volume within one week period of training-exposure to hypoxic condition. This fact supports the view that the improvement of the right heart capacity might be involved in the establishment of acclimatization to altitude. Changes in ascorbic acid in different organs at altitude are being studied in order to elucidate the role of this substance in acclimatization or tolerance to altitude. The results obtained so far show that the well acclimatized or tolerant animals have a larger capacity for utilizing ascorbic acid at altitude than do unacclimatized or less tolerant animals. This suggests that the administration of large amount of ascorbic acid may improve the tolerance to hypoxia. (Author)
AD-656 529 HC$3.00 MF$0.65

DETERMINATION OF IODIDE CLEARANCE AND EXIT RATE CONSTANTS IN INCUBATED THYROID LOBES,
Army Medical Research and Nutrition Lab Denver Colo Physiology Div
Martin I. Surks. 6 Sep 66, 8p
Availability: Published in Endocrinology v80 n6 -7 Jun 1967.

Descriptors: (*Iodides, Tracer studies), Thyroid gland, Radioactive isotopes, Dynamics, Hypoxia, Perchlorates, Labeled substances, In vitro analysis, In vivo analysis, Iodine, Diet, Rats.

Propylthiouracil (PTU)-blocked thyroid lobes were incubated in Krebs-Ringer-phosphate for different times with 2 isotopes of iodine. On the basis of an open 2-compartment model, the one-way iodide clearance (C/m) from the medium as well as the iodide exit rate constant (K sub TM) were determined directly and simultaneously. When oxygen concentration was reduced from 100 to 20.9 or 12%, K sub TM significantly increased but C/m was unchanged. Incubation under 100% nitrogen effected a further increase in K sub TM as well as a reduction in C/m. Addition of $NaClO_4$ or excess iodide to the medium caused an elevation in K sub TM and a reduction in C/m. In the iodide experiments, however, the decrease in C/m was interpreted to result primarily from a reduction in the specific activity of medium radioiodide. Exposure to increased endogenous thyrotropin effected by feeding a low iodine or a 0.3% PTU diet for 7 or 14 days significantly reduced K sub TM ($p<0.001$). C/m was increased on the low iodine diet but unchanged on the PTU diet. (Author)
AD-656 552 Not available from CFSTI.

A COMPARISON OF AC AND DC EYE MOVEMENT RECORDING,
Pennsylvania Hospital Philadelphia Unit for Experimental Psychiatry
Bernard Tursky, and Donald N. O'Connell. 1966, 10p
AFOSR-67-1842
Grants AF-AFOSR-707-65, PHS-MH-04172
Availability: Published in Psychophysiology v3 p157-63 1966.

Descriptors: (*Eye, Motion), (*Sleep, Electrophysiology), Distortion, Electrodes, Psychophysiology.
Identifiers: Electro-oculography.

This study demonstrates the distortions introduced into the electro-oculographic record as a function of choice of recorder time constant. Controlled waking eye movements were simultaneously recorded on five separate channels from the same pair of nonpolarizable Ag/AgCl electrodes. Time constants for these channels were DC, 3 sec, 1 sec, 0.3 sec, and 0.1 sec. Results indicate that eye movement recorded through short time constants cannot differentiate between rapid eye movement and saccadic components of slow eye movements, cannot follow slow smooth eye movements, and cannot show the position of the eyes when they are not in motion. The use of DC coupling makes it possible to record these three classes of events faithfully. (Author)
AD-656 650 Not available from CFSTI.

VARIAZIONI DI AMPIEZZA DEL POTENZIALE ICO EVOCATO DA STIMOLI LUMINOSI DURANTE IL SONNO NELL'UOMO (Amplitude Changes of the EEG Potential Evoked by Photic Stimuli During Sleep in Man),
Genoa Univ (Italy) Clinica Neurochirurgica
F. Corletto, A. Gentilomo, G. Rosadini, G. F. Rossi, and J. Zattoni. 15 Jul 66, 6p
AFOSR-67-1855
Contract AF 61 (052)-901
Text in Italian.
Availability: Published in Bollettino della Societa Italiana di Biologia Eperimentale v42 n23 p1704-6 1966.

Descriptors: (*Sleep, *Electroencephalography), Eye, Motion, Electrophysiology, Humans, Italy.
Identifiers: Wakefulness.

The largest changes of the amplitude of the visual evoked potential, in respect to wakefulness, occur during the phases of sleep electroencephalographically characterized by spindles and slow waves. In this sleep state the amplitude is markedly increased. During sleep with 'desynchronized' EEG and rapid eye movements, the amplitude of the visual evoked potential is similar to that recorded during wakefulness. (Author)
AD-656 661 Not available from CFSTI.

COMPORTAMENTO DELLE SINGOLE COMPONENTI DEL POTENZIALE EVOCATO VISIVO DURANTE IL SONNO NELL'UOMO (Behavior of the Single Components of the Visual Evoked Potential During Sleep in Man),
Genoa Univ (Italy) Clinica Neurochirurgica
F. Corletto, A. Gentilomo, G. Rosadini, G. F. Rossi, and J. Zattoni. 15 Jul 66, 8p
AFOSR-67-1856
Contract AF 61 (052)-901
Text in Italian.
Availability: Published in Bollettino della Societa Italiana di Biologia Sperimentale v42 n23 p1706-10 1966.

Descriptors: (*Sleep, *Electroencephalography), Physiology, Nervous system, Electrophysiology, Humans, Eye, Motion, Italy.
Identifiers: Wakefulness.

Five main components, having different polarities and latencies, are usually recognized in the visual potential evoked during wakefulness. Their behavior during sleep is dissimilar. The short latency's components are little affected by sleep. The main change observed is the increase in amplitude during EEG 'synchronized' sleep of the components having a peak latencies between 80 and 200 msec. During EEG 'desynchronized' sleep with rapid

eye movements the components of the evoked potential are similar to those recorded during wakefulness. The neurophysiologic meaning of these findings is emphasised. (Author)
AD-656 662 Not available from CFSTI.

THE ROLE OF PUTRESCINE IN MICROBIAL METABOLISM.
New Hampshire Univ Durham
For primary bibliographic entry see Field 6A.
AD-656 737 HC$3.00 MF$0.65

TRENDS IN SYSTOLIC BLOOD PRESSURE IN THE THOUSAND AVIATOR COHORT OVER A 24-YEAR PERIOD.
Naval School of Aviation Medicine, Pensacola, Fla.
A. Graybiel, W. R. Harlan, Jr., N. E. Lane, R. E. Mitchell, and A. Oberman. 25 Apr 67, 22p
NASA-CR-85973, NAMI-1004
NASA ORDER R-136

Descriptors: *Age factor, *Blood pressure, *Human body, *Time dependency, *Weight factor, Age, Arm, Aviation, Blood, Body, Cardiovascular, Circumference, Combination, Dependency, Epidemiology, Factor, Gain, Heredity, Human, Hypertension, Medicine, Obesity, Pilot, Prediction, Pressure, Systolic, Time, Weight.

For abstract, see STAR 05 18.
N67-31643 HC$3.00 MF$0.65

THE EFFECT OF ELECTROMAGNETIC AND MAGNETIC FIELDS ON THE CENTRAL NERVOUS SYSTEM.
Farnham (Frank C.) Co., Philadelphia, Pa.
YU. A.Kholodov. Jun 67, 256p NASA-TT-F-465
Contract NASW-1497
Transl. Into English of the Book "vliyaniye Elektromagnitnykh I Magnitnykh Poley Na Tsentral'nuyu Nervnuyu Sistemu" Moscow, Izd. Nauka, 1966 P 1-280

Descriptors: *Animal study, *Central nervous system, *Conditioned response, *Electromagnetic field, *Electrophysiology, *Magnetic field, Animal, Brain, Central, Chemical, Condition, Electric, Electromagnetic, Field, Fish, Frequency, Magnetic, Mammal, Nervous, Physiology, Rabbit, Response, Sensitivity, Stimulus, Study, System, Ultrahigh, Vertebrate.

For abstract, see STAR 05 18.
N67-31733 HC$3.00 MF$0.65

A STUDY OF PHYSIOLOGICAL MECHANISMS AND INTER-RELATIONS BETWEEN SYSTEMIC AND REGIONAL BLOOD VOLUME, BLOOD FLOW AND ELECTROLYTE BALANCE INTERIM PROGRESS REPORT.
Harvard Univ., Boston, Mass. Thorndike Memorial Lab.
W. H. Abelmann, and L. E. Earley. 30 Jun 67, 8p
NASA-CR-86695
Grant NSG-595

Descriptors: *Hemodynamic response, *Renal function, *Sodium, *Water, Animal, Balance, Blood, Bone, Calcium, Circulation, Dog, Excretion, Function, Heart, Hemodynamic, Kidney, Physiology, Pressure, Renal, Response, Study, Tilt.

For abstract, see STAR 05 18.
N67-31876 HC$3.00 MF$0.65

6Q. Protective Equipment

THEORETICAL STUDIES OF COMPLEXED TRANSITION METAL PHOTOTROPIC SYSTEMS.
Nuclear Research Associates, Inc., Long Island City, N. Y.
For primary bibliographic entry see Field 7E.
AD-470 074 HC$3.00 MF$0.65

ATTENUATION CHARACTERISTICS OF EARMUFFS AT LOW AUDIO AND INFRASONIC FREQUENCIES.
Final rept. Jan 66-May 66,
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
Charles W. Nixon, Harald K. Hille, and L. Keith Kettler. May 67, 24p Rept no. AMRL-TR-67-27

Descriptors: (*Ear protectors, Attenuation), Extremely low frequency, Psychoacoustics, Thresholds (Physiology), Hearing, Sound, Protection, Effectiveness.

Sound attenuation and transmission loss characteristics of three different earmuffs models were determined from (1) physical measurements of discrete frequency signals in the range from 1 to 500 Hz inside and outside earmuffs being worn by subjects and (2) psychoacoustical or subjective measurements employing the United States of America Institute of Standards 'Real Ear Attenuation at Threshold Method.' Evaluation of the data showed good correlation between the two measurement methods. Greater attenuation was obtained with the subjective method. It was interpreted to be due primarily to the masking effects at threshold of hearing of physiological noise present under the earcups. Findings show that typical present-day earmuffs provide approximately 10 dB of attentuation in the frequency range from 20 to 100 Hz and very little sound protection below 20 Hz. It is recommended that insert earplugs be used for sound protection in intense low audio frequency and infrasonic sound fields. Good earmuffs in combination with insert earplugs should provide more protection than earplugs alone. (Author)
AD-655 939 HC$3.00 MF$0.65

ELECTRICALLY HEATED HANDWEAR.
Summary rept.,
Army Natick Labs Mass Clothing and Organic Materials Div
Herman Madnick, and Alice Park. Mar 67, 23p Rept no. C/ED-46
USA-NLABS-TR-67-82-CM

Descriptors: (*Gloves, Heating elements), Operators (Personnel), Arctic regions, Aviation personnel, Heating, Exposure, Frostbite.

Electrically heated handwear is presented as a solution to the hand-protection problem for equipment operators and other military personnel who must use their hands in extremely cold conditions for prolonged periods. The problem of hand cold injury, the inadequacy of conventional solutions and existing handwear, and various experimental approaches are discussed. The U.S. Army Natick Laboratories has assembled an auxiliary electrical handwear system and is continuing research efforts to improve electrically heated handwear. It is concluded that because of the demonstrated need for such handwear and the current feasibility of manufacturing it, electrically heated handwear should be supplied to the appropriate personnel. (Author)
AD-656 742 HC$3.00 MF$0.65

SOUND ATTENUATION CHARACTERISTICS OF THE NAVY SPH-3 (MODIFIED) (LS) HELMET,
Army Aeromedical Research Unit Fort Rucker Ala
Robert T. Camp, Jr., and Robert L. Keiser. May 67, 25p Rept no. USAARU-67-8

Descriptors: (*Helmets, Acoustic properties), Hearing, Protection, Psychoacoustics, Effectiveness, Sound, Attenuation, Ear protectors.

An evaluation of the real-ear sound attenuation characteristics of the Navy SPH-3 (Modified) (LS) Helmet was done with procedures and equipment specified by ASA Z24.22 - 1957. The results show that the SPH-3 (Modified) (LS) is a relatively efficient attenuator of sound throughout the audio spectrum. In view of the poor sound attenuation characteristics of the Army APH-5, it has been recommended that this helmet be replaced by the SPH-3 (Modified) (LS). (Author)
AD-656 748 HC$3.00 MF$0.65

UNDERWATER OPERATION EXPERIMENTS EVALUATION.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 05 18.
N67-31849 HC$3.00 MF$0.65

6R. Radiobiology

NONTHERMAL EFFECTS OF MICROWAVE RADIATION.
Final rept. 1957-62,
California Univ., Berkeley. Electronics Research Lab.
C. Susskin, and S. Prazusnitz. 31 Oct 62, 40p Ser-60/Iss-489
RADC-TDR-62-624
Contracts AF 41 (657)-114, Nonr-222 (92)

Descriptors: (*Microwaves, *Radiation hazards), Life span, Mice, Genetics, Diseases.

Chronic irradiations of mice with 3-cm microwaves, carried out at the University of California during the past several years, have shown no clear effects on longevity at the sublethal doses employed. Some other effects, notably with regard to cancer of the white cells and testicular damage, resulted from this pilot study. The report also contains a summary of the results obtained by P. O. Vogelhut in irradiating enzymes at the same wavelength; these results are described in greater detail in another report in this Series. (Author)
AD-400 115 HC$3.00

RESULTS OBTAINED TO DATE FROM A STUDY OF THE EFFECTS OF IONIZING IRRADIATION AND ITS EFFECT UPON FORMATION AND DEVELOPMENT OF THE HEALING WOUND.
Final technical rept. 1 Sep 61-31 Aug 62,
Texas Univ., Dallas. Southwestern Medical School.
B. L. Reynolds. 31 Aug 62, 13p
Contract DA-49-193-MD-2193

Descriptors: (*Wound + injuries, Radiation effects), (*Radiation effects, Healing), Chromatographic analysis, Tissues (Biology), Survival, Recovery, Steroids, Lethal dosage, Metabolism, Whole body irradiation.

Chemical dissection of the period of recovery or relative energy gain during the healing of open skin wounds in animals has been investigated in detail in the past twelve months. Striated muscle, areolar connective tissue, certain endocrine organs, and the site of injury itself are the tissues titrated with respect to chemical changes during the process of edge approximation in healing. If exogenous total body irradiation of 1200 - 1500r be given at the optimum time during the recovery period, survival is increased from LD35 to 45 at 15 days. By use of improved analytical techniques the behavior of steroid substances, aromatic acids, fatty acids, amino acids, and sialic acids have been observed in each of the previously mentioned tissues. (Author)
AD-412 857 HC$3.00

EFFECT OF CALCIUM ON MITOSIS IN THE THYMUSES OF NORMAL AND IRRADIATED RATS,
National Research Council of Canada Ottawa (Ontario) Div of Radiation Biology
A. D. Perris, and J. F. Whitefield. 1967, 3p
NRC-9575
Availability: Published in Nature v214 n5085 p302-3 Apr 15 1967.

Descriptors: (*Mitosis, Calcium), (*Calcium, Radiation effects), (*Radiation effects, Mitosis), Thymus, Rats, Radiobiology, Injection (Medicine), Parathyroid hormones, Canada.

Raising the calcium level in animals after irradiation, either directly by injection of calcium salts, or indirectly by injection of parathyroid hormone, increases their survival. The present observations suggest that this therapeutic effect of calcium may well be a result of mitotic stimulation in those highly radiosensitive tissues the integrity of which is vital if the animal is to survive. (Author)
AD-655 870 Not available from CFSTI.

RADIATION-PRODUCED AGGREGATION AND INACTIVATION IN EGG WHITE LYSOZYME,
Army Medical Research and Nutrition Lab Denver Colo
For primary bibliographic entry see Field 6A.
AD-656 359 Not available from CFSTI.

RADIATION SITUATION AND ACTION OF TROOPS,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 15F.
AD-656 563 HC$3.00 MF$0.65

RADIOLOGICAL PHYSICS DIVISION ANNUAL REPORT, JULY 1965 TO JUNE 1966,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 7E.
For abstract, see NSA 21 15.
ANL-7220 HC$3.00 MF$0.65

MEDICAL SURVEY OF THE PEOPLE OF RONGELAP AND UTIRIK ISLANDS ELEVEN AND TWELVE YEARS AFTER EXPOSURE TO FALLOUT RADIATION (MARCH 1965 AND MARCH 1966),
Brookhaven National Lab., Upton, N. Y.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 15.
BNL-50029 HC$3.00 MF$0.65

SMALL BOY PROJECT 62.80B AERORADIOACTIVITY SURVEY.
Edgerton, Germeshausen and Grier, Inc., Santa Barbara, Calif.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 15.
CEX-62.80B HC$3.00 MF$0.65

SEDAN PROJECT 62.80C, AERORADIOACTIVITY SURVEY.
Edgerton, Germeshausen and Grier, Inc., Santa Barbara, Calif.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 15.
CEX-62.80C HC$3.00 MF$0.65

LUMINESCENCE DOSIMETRY,
Division of Technical Information Extension (Aec), Oak Ridge, Tenn.
Frank H. Attix. Apr 67, 532p AEC Symposium series no. 8.
AT(04-3)-115
Proceedings of International Conference on Luminescence Dosimetry Stanford Univ., Stanford, Calif. Jun 21-23, 1965. Prepared in cooperation with Nonr and Stanford Univ.

Descriptors: (*Luminescence, *Dosimeters), Symposia, Radiation measurement systems.

For abstract, see NSA 21 15.
CONF-650637 HC$3.00 MF$0.65

RELATIONSHIP OF EFFICIENCY TO PRESSURE DROP OF RESPIRATOR CARTRIDGES WITH INTRODUCED DEFECTS,
Hanford Occupational Health Foundation, Richland, Wash. Occupational Hygiene Dept.
F. E. Adley, and A. G. Rolie. Feb 67, 6p
Contract AT (45-1)-1837

Descriptors: (*Defects (Materials), *Respirators), (*Health physics, Nuclear engineering), (*Protective masks, Efficiency).

For abstract, see NSA 21 15.
HOHF-3 HC$3.00 MF$0.65

RADIATION LEVELS AT THE LOS ALAMOS TANDEM ACCELERATOR FACILITY,
Los Alamos Scientific Lab., N. Mex.
Morris J. Engelke, Thomas P. Seitz, and Richard L. Henkel. 27 Dec 66, 29p
Contract W-7405-eng-36

Descriptors: (*Particle accelerators, *Protons), (*Particle beams, *Deuterons), Tritons, Helium, Oxygen, Ions, Nuclear reactions.

For abstract, see NSA 21 15.
LA-3641 HC$3.00 MF$0.65

RADIOISOTOPE SOURCE SAFETY TESTING,
Oak Ridge National Lab., Tenn.
K. W. Haff, R. G. Niemeyer, and R. A. Robinson. May 67, 157p
Contract W-7405-eng-26

Descriptors: (*Radioactive isotopes, Sources), (*Safety, *Nuclear reactors), (*Nuclear physics laboratories, Nuclear engineering), Nuclear power plants, Reactor safety systems, Reactor system components, Containment, Test equipment, Cerium.

For abstract, see NSA 21 15.
ORNL-4092 HC$3.00 MF$0.65

DOSE-ESTIMATION STUDIES RELATED TO PROPOSED CONSTRUCTION OF AN ATLANTIC-PACIFIC INTEROCEANTIC CANAL WITH NUCLEAR EXPLOSIVES PHASE I,
Oak Ridge National Lab., Tenn.
K. E. Cowser, S. V. Kaye, and P. S. Rohwer. Mar 67, 221p
Contract W-7405-eng-26

Descriptors: (*Nuclear explosions, *Inland waterways), Atlantic Ocean, Pacific Ocean, Construction, Radiobiology, Dose rate.

For abstract, see NSA 21 15.
ORNL-4101 HC$3.00 MF$0.65

THE EFFECT OF REPEATED TREATMENT WITH GAMMA RAYS ON THE RADIO-RESISTANLATED BACTERIA,
Massachusetts Inst. of Tech., Cambridge. Dept. of Nutrition and Food Science.
For primary bibliographic entry see Field 6H.
For abstract, see NSA 21 15.
TID-23707 HC$3.00 MF$0.65

HAZARDS CONTROL PROGRESS REPORT NO. 26, SEPTEMBER-DECEMBER 1966 AND INDEX TO HAZARDS CONTROL PROGRESS REPORTS NOS. 24 THROUGH 26.
California Univ., Livermore. Lawrence Radiation Lab.
1966, 58p
Contract W-7405-eng-48

Descriptors: (*Reactor hazards, Control), Indexes, Reports, Detectors, Plutonium, X rays, Protons, Counting methods.

For abstract, see NSA 21 15.
UCRL-50007-66-2 HC$3.00 MF$0.65

IMPROVEMENTS IN THE SOLID-STATE PLUTONIUM-ALPHA AIR MONITOR,
California Univ., Livermore. Lawrence Radiation Lab.
C. L. Lindeken, and R. W. Lakin. 19 Apr 67, 11p
Contract W-7405-eng-48

Descriptors: (*Plutonium, *Pulse height analyzers), (*Radiation monitors, Detectors), Sampling, Gas flow, Radioactivity, Airborne, Costs, Health physics.

For abstract, see NSA 21 15.
UCRL-50228 HC$3.00 MF$0.65

BRIEF DESCRIPTION OF RESEARCH PUBLISHED OR ACCEPTED FOR PUBLICATION DURING 1966,.
Rochester Univ., N. Y. Atomic Energy Project.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 15.
UR-49-748 HC$3.00 MF$0.65

6S. Stress Physiology

CARDIOPULMONARY EFFECTS OF PRESSURE BREATHING DURING HYPOTHERMIA.
Final rept.,
Duke Univ Durham N C Medical Center
John Salzano, and F. G. Hall. Apr 67, 22p
AMRL-TR-66-184
Contract AF 33 (657)-8854

Descriptors: (*Pressure breathing, *Hypothermia), Respiration, Cardiovascular system, Pulse rate, Heart, Blood volume, Oxygen consumption, Carbon dioxide, Hyperventilation, Lungs, Tolerances (Physiology), Stress (Physiology).

Continuous pressure breathing was studied in hypothermic anesthetized dogs. Alveolar ventilation decreased during continuous positive pressure breathing (CPPB) and increased during continuous negative pressure breathing (CNPB). The changes in alveolar ventilation were due to changes in respiratory rate as well as in respiratory dead space. Cardiac output fell significantly during CPPB due to a reduction in heart rate and stroke volume. During CNPB cardiac output was only slightly greater than during control as a result of a fall in heart rate and an increase in stroke volume. Oxygen consumption was reduced to 60% of control during CPPB of 16 cm H2O, but was 25% greater than control during CNPB. Qualitatively, CO2 production changed as did O2 consumption, but was different quantitatively during CNPB, indicating hyperventilation due to increased respiratory rate. Mean pulmonary artery pressures and pulmonary resistance varied directly with the applied intratracheal pressure. The results indicate that the hypothermic animal can tolerate an imposed stress such as CPPB and can increase its O2 consumption during CNPB as does the normothermic animal. (Author)
AD-655 935 HC$3.00 MF$0.65

THE EFFECTS OF POSTURE, BREATHING PRESSURE, AND IMMERSION IN WATER ON

Group 6S—Stress physiology

LUNG VOLUMES AND INTRAPULMONARY PRESSURES.
Final rept. Jul 64-Jun 65,
Ohio State Univ Columbus
Leonard James Thompson, Michael McCally, and A. S. Hyde. May 67, 46p
AMRL-TR-66-201
Contract AF 33 (657)-11698

Descriptors: (*Physiology, *Underwater), Lungs, Volume, Pressure breathing, Posture, Hydrostatic pressure, Stress (Physiology).

Lung volumes were measured by spirometry and single breath helium dilution in five subjects under various combinations of posture, breathing pressure, and headout neutral temperature immersion. Tidal volume was unaltered. Vital capacity was reduced significantly only by negative pressure breathing during seated immersion. Seated immersion decreased total lung capacity and functional residual capacity, but the supine posture underwater partially restored these decreases. Positive pressure breathing increased total lung capacity and residual volume for the seated subject in both air and water. A wide range of transthoracic pressure gradients is subjectively more comfortable than a slight increase in the transpharyngeal pressure gradient, suggesting that during immersion, intrapulmonic pressures are selected by the subject to minimize the transpharyngeal pressure gradient. (Author)
AD-655 938 HC$3.00 MF$0.65

THE PROBLEMS OF VISION IN FLIGHT AT HIGH ALTITUDE,
Advisory Group for Aeronautical Research and Development Paris (France)
Thomas C. D. Whiteside. 1957, 80p Rept no. AGARD-ograph-13

Descriptors: (*Vision, High altitude), (*Aviation medicine, Vision), Solar radiation, Eye, Intensity, Scattering, Adaptation (Physiology), Afterimages, Anoxia, Visibility, Retina, Visual acuity, France.

Contents: Effects of changes in intensity and spectral distribution of sunlight at high altitude; Physiological changes affecting visibility of objects inside the cockpit; Physiological factors affecting air-to-air visibility.
AD-655 967 HC$3.00 MF$0.65

ENERGY, NITROGEN, AND WATER REQUIREMENTS OF NORMAL ADULTS RESIDING AT 4300 METERS FOR 28 DAYS,
Army Medical Research and Nutrition Lab Denver Colo Bioenergetics Div
For primary bibliographic entry see Field 6P.
AD-656 462 HC$3.00 MF$0.65

EFFECT OF HIGH ALTITUDE TO HEMATOPOIETIC PROCESS.
Toho Univ Tokyo (Japan) School of Medicine
For primary bibliographic entry see Field 6P.
AD-656 529 HC$3.00 MF$0.65

A BIBLIOGRAPHICAL SOURCEBOOK OF COMPRESSED AIR, DIVING AND SUBMARINE MEDICINE, VOLUME III,
Medical Coll of Virginia Richmond Dept of Psychiatry
Ebbe Curtis Hoff, and Leon Jack Greenbaum, Jr. Dec 66, 315p
Contract Nonr-1134 (04)
Prepared in cooperation with Naval Medical Research Inst., Bethesda, Md.
Availability: Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402 $3.25.

Descriptors: (*Stress (Physiology), Underwater), Military medicine, Compressed air, Diving, Submarine personnel, Decompression sickness, Oxygen, Carbon dioxide, Helium group gases, Acclimatization, Vision, Hearing, Hydrostatic pressure, Toxicity, Pathology, Carbon monoxide, Poisoning, Motion sickness, Submarine escape, Ventilation, Air pollution, Selection, Human engineering, Sleep, Performance (Human), Scuba divers, Hazards, Diseases, Accidents, Training, Psychiatry.

Contents: Technical procedures and research apparatus in compressed air, diving and submarine medicine; Special anatomy, physiology and biochemistry of compressed air, diving and submarine medicine; Biology of very high hydrostatic pressures; Diseases and accidents in submarine personnel, divers, and compressed air workers; Protection and preservation of personnel; Selection and training of submarine personnel, divers and compressed air workers; Special psychological and psychiatric problems; Special problems of SCUBA diving.
AD-656 674 MF$0.65

CARDIOVASCULAR EFFECTS OF VIBRATION SEMIANNUAL REPORT, 1 AUG. - 31 DEC. 1966.
Ohio State Univ. Research Foundation, Columbus. Environmental Medicine Lab.
L. B. Roberts. Jun 67, 17p NASA-CR-85611, REPT.-3
Contracts NGR-36-008-041, RF-2045

Descriptors: *Animal study, *Cardiovascular system, *Human reaction, *Vibration effect, Animal, Blood, Cardiovascular, Dog, Effect, Electrode, Equipment, Heart, Human, Measurement, Method, Pressure, Rate, Reaction, Study, System, Vibration.

For abstract, see STAR 05 18.
N67-31859 HC$3.00 MF$0.65

CERTAIN ASPECTS CONCERNING OXYGEN METABOLISM OF THE BODY EXPOSED TO PROLONGED ACCELERATIONS.
Nekotorrye Storony Kislorodnogo Obmena Organizma Pri Dlitel'no Deystvuyushchikh Uskoreniyakh
National Aeronautics and Space Administration, Washington, D. C.
YE. I.Sorokina. Aug 67, 7p NASA-TT-F-11135
Transl. Into English From Kosmicheskaya Biol. I Med., (USSR), Vol. 1, No. 2, 1967 P 26-30

Descriptors: *Brain injury, *Oxygen metabolism, *Physiological acceleration, Acceleration, Animal, Brain, Diffusion, Injury, Metabolism, Muscle, Oxidation, Oxygen, Physiology, Potential, Prolongation, Reduction, Temperature, Tension, Tissue, Transverse.

For abstract, see STAR 05 18.
N67-32317 HC$3.00 MF$0.65

STUDY OF SLEEP CHARACTERISTICS UNDER CONDITIONS OF SIMULATED MANNED SPACE FLIGHT.
Izucheniye Osobennostey Sna V Usloviyakh, Modeliruyushchikh Kosmicheskiy Polet
National Aeronautics and Space Administration, Washington, D. C.
V. I. Myasnikov. Aug 67, 7p NASA-TT-F-11138
Transl. Into English From Kosmich. Biol. I Med. (USSR), Vol. I, No. 2, 1967 P 59-63

Descriptors: *Manned space flight, *Physiology, *Sleep, *Spacecrew, Acceleration, Adaptation, Angular, Fatigue, Flight, Isolation, Manned, Motion, Noise, Pattern, Sickness, Simulation, Space, Stress.

For abstract, see STAR 05 18.
N67-32331 HC$3.00 MF$0.65

STUDY OF THE WORK AND REST CYCLES OF TEST SUBJECTS EXPOSED TO RELATIVE ISOLATION.
Izucheniye Rezhimov Zhiznedeyatel'nosti Gruppy Ispytateley, Nakhodyaschikhsya V Usloviyakh Otnositel'noy Izolyatsii
National Aeronautics and Space Administration, Washington, D. C.
B. A. Dushkov, N. N. Gurovskiy, and F. P. Kosmolinskiy. Aug 67, 7p NASA-TT-F-11137
Transl. Into English From Kosmich Biol. I Med. (USSR), Vol. I, No. 2, 1967 P 54-59

Descriptors: *Human behavior, *Social isolation, *Test chamber, *Work-rest cycle, Acid, Ascorbic, Behavior, Cardiovascular, Chamber, Cycle, Diurnal, Emotion, Human, Isolation, Muscle, Nervous, Physiology, Psychology, Rest, Stress, Test, Urine, Work.

For abstract, see STAR 05 18.
N67-32362 HC$3.00 MF$0.65

6T. Toxicology

PROBLEMS IN AERIAL APPLICATION: DIRECTION OF MILD POISONING BY ORGANOPHOSPHORUS PESTICIDES USING AN AUTOMATED METHOD FOR CHOLINESTERASE ACTIVITY,
Civil Aeromedical Inst Oklahoma City Okla
Patsy R. Fowler, and Jess M. McKenzie. Apr 67, 15p
FAA-AM-67-5

Descriptors: (*Cholinesterase, Chemical analysis), Blood chemistry, Tissues (Biology), Toxicity, Pesticides, Insecticides, Automatic, Organic phosphorus compounds, Carbamic acids, Poisoning.

An automated method, capable of measuring cholinesterase activity in blood and tissue samples, was modified to provide increased reliability. The technique was evaluated as a means of detecting and measuring the inhibition of enzyme by organophosphorus and carbamate insecticides. As many as 200 specimens a day may be analyzed by the improved method, which provides precise estimates of cholinesterase activity in normal and poisoned samples. (Author)
AD-656 211 HC$3.00 MF$0.65

RESEARCH ON OXYGEN TOXICITY AT THE CELLULAR LEVEL.
Final rept. 15 Apr 65-15 Jun 66,
IIT Research Inst Chicago Ill
Willis H. Riesen, James Q. Kissane, Raymond W. Bieber, Harold P. Kaplan, and Philip Felig. Dec 66, 85p Rept no. IITRI-L6027-13
AMRL-TR-66-206
Contract AF 33 (615)-2164, NASA Order R-87

Descriptors: (*Oxygen, Toxicity), Cells (Biology), Metabolism, Enzymes, Lungs, Manned spacecraft, Liver, Mitochondria, Body weight, Space medicine, Life support, Toxic tolerances, Monkeys, Rats.

The use of pure oxygen atmospheres at reduced pressure in manned spacecraft has stimulated new research interest. Exposure of humans to pure oxygen at total pressures of 5 to 7 psia for up to 30 days has generally produced only subjective and occasional symptomatic distress. Nevertheless, studies with animals have clearly documented toxicity if the exposure to pure oxygen is at higher total pressures. The selection of suitable oxygen atmospheres for manned space flight and the development of protective measures against toxic manifestations will be considerably facilitated by a clearer understanding of the toxic syndrome. Rats, dogs, and monkeys were exposed to pure (98.5%) oxygen at 1 atm and 1/3 atm in a closed, recirculating chamber and in a nonrecirculating chamber. Rats exposed to a pressure of 1 atm showed significant reduction in efficiency of liver mitochondrial oxidative phosphorylation. Weight

loss accompanied this change. Insignificant changes were found in liver or lung mitochondrial oxygen consumption; liver or lung NAD, NADH, or NAD/NADH; and arterial blood lactate and pyruvate, and lactate/pyruvate ratio. A composite index of oxygen toxicity was derived from a multivariant data analysis. Exposure of rats to pure oxygen at 1/3 atm showed slight elevation in P/O ratio in 7 days. The ratio returned to normal in 2 weeks and remained so for 8 months. No significant weight changes were observed. Only preliminary experiments with the dogs and monkeys were conducted, therefore no conclusions can as yet be made. There is an indication that monkeys are more resistant to oxygen toxicity at 1 atm than rats. (Author)
AD-656 495 HC$3.00 MF$0.65

BIOCHEMICAL STUDIES ON THE TOXIC NATURE OF SNAKE VENOM.
Final rept. no. 1, 6 May 66-5 May 67,
Kaohsiung Medical Coll (Taiwan) Dept of Biochemistry
Chen-chung Yang. May 67, 35p
ARDG (FE)-J-262-2
Contract DA-92-557-FEC-39509

Descriptors: (*Venoms, Toxicity), Reptiles, Molecular association, Thiols, Toxins + antitoxins, Spectra (Infrared), Purification, Fluorescent antibody techniques, Immunity, Oxidation, Refractive index, Taiwan.

Clarification of the status of sulfur bonds in the biologically-active protein is very important not only for the establishment of structure but also for the elucidation of their relation to the biological activity. The total content of half cystine plus cysteine of cobrotoxin was measured to be 12.0 by disulfide interchange reactions. No sulfhydryl groups were detected by spectrophotometric titration with p-chloromercuribenzoate and N-ethylmaleimide even after cobrotoxin was treated with 8 M urea. Since no methionine was found on amino acid analysis, the sulfurs in cobrotoxin were proved to be exclusively in the form of disulfide bonds. On reduction with -mercaptoethanol, cobrotoxin displays 11.6 to 12.0 sulfhydryl groups and loses its lethality concurrently. However, the inert, fully reduced cobrotoxin yields biologically active product with complete lethality and antigenicity, specific rotation close to the native value, and an infrared spectrum identical to native cobrotoxin on reoxidation. The results clearly indicate that the integrity of the disulfide bonds in cobrotoxin is essential for lethality. An optical rotatory dispersion (ORD) study was made of the native, reduced and reoxidized cobrotoxin preparations in the wavelength range 220-300 millimicrons and a positive Cotton effect at 233 millimicrons was discovered for the native cobrotoxin. (Author)
AD-656 531 HC$3.00 MF$0.65

6U. Weapon Effects

A STUDY OF WORLD WAR II GERMAN FIRE FATALITIES.
Technical note,
Dikewood Corp Albuquerque N Mex
J. A. Keller. Apr 66, 31p Rept no. DC-TN-1050-3
Contract OCD-PS-65-53

Descriptors: (*Fires, *Mortality rates), Population, Incendiary bombs, Urban areas, Incendiary ammunition, History, Statistical analysis, Tables, Casualties, East Germany, West Germany.

Ranges for estimated fire fatalities are developed for firestorms and group fires initiated by conventional weapons in German cities during World War II. Firestorm fatalities are estimated to vary between 4% and 20% of the population-at-hazard. Group fire fatalities are estimated to include up to 4% of the population-at-hazard. Limitations on extension of these estimates to the nuclear case and to U.S. cities are discussed. (Author)
AD-655 864 HC$3.00 MF$0.65

7. CHEMISTRY

7A. Chemical Engineering

ORGANOMETALLIC SULFUR COMPLEXES. VI. THE MOLECULAR STRUCTURE OF A TRICYCLIC COMPLEX, TRICOBALT ENNEACARBONYL SULFIDE,
Wisconsin Univ Madison Dept of Chemistry
Chin Hsuan Wei, and Lawrence F. Dahl. 11 Nov 66, 11p
AFOSR-67-1714
Grant AF-AFOSR-518-66
Research supported in part by NSF. See also AD-648 892.
Availability: Published in Inorganic Chemistry v6 n6 p1229-36 Jun 1967.

Descriptors: (*Metalorganic compounds, *Complex compounds), (*Sulfur compounds, Complex compounds), (*Cobalt compounds, Complex compounds), (*Metal carbonyls, Complex compounds), Sulfides, X-ray diffraction analysis, Molecular structure, Crystal structure, Crystal lattices, Stereochemistry, Chemical bonds, Heterocyclic compounds.
Identifiers: Tricobalt enneacarbonyl sulfide.

A three-dimensional X-ray characterization of SCo3 (CO)9, obtained by the reaction of dicobalt octacarbonyl with phenyl mercaptan, provided the detailed molecular features of an organometallic complex containing a sulfur atom symmetrically bridging three metal atoms. Tricobalt enneacarbonyl sulfide forms triclinic crystals with four molecules in a centrosymmetric primitive unit cell of lattice parameters a = 9.67A, b = 13.23A, ć = 13.41A, alpha = 110 deg., beta = 108 deg. 23 min., and gamma = 97 deg. 21 min. Structural refinement by a full-matrix, least-squares method yielded an unweighted reliability index of R1 = 10.9%. The idealized molecular configuration of trigonal C3v symmetry consists of an apical sulfur atom coordinated by three Co-S bonds to a Co3 (CO)9 fragment of three equilaterally arranged Co (CO)3 groups bonded to one another by cobalt-cobalt bonds. The salient stereochemical features of SCo3 (CO)9 are compared with those of Co3 (CO)9CCH3 and other related molecular complexes. (Author)
AD-655 896 Not available from CFSTI.

ELECTROCHEMICAL CARBON DIOXIDE SENSOR.
Ionics Inc Watertown Mass
For primary bibliographic entry see Field 6K.
AD-655 936 HC$3.00 MF$0.65

INVESTIGATION OF AN INTEGRATED CARBON DIOXIDE-REDUCTION AND WATER-ELECTROLYSIS SYSTEM.
Battelle Memorial Inst Columbus Ohio Columbus Labs
For primary bibliographic entry see Field 6K.
AD-655 937 HC$3.00 MF$0.65

A NOTE ON SIZE DISTRIBUTION IN GRANULATION, BALLING AND WET PELLETIZATION,
National Research Council of Canada Ottawa (Ontario)
C. E. Capes. 12 Dec 66, 7p Rept no. NRC-9494
Availability: Published in Chemical Engineer pCE78-80 Apr 1967.

Descriptors: (*Pellets, Production), Particle size, Distribution, Ores (Metal sources), Fertilizers, Coagulation, Industrial production, Canada.

Data are given for the effect on granule-size distribution of continuously adding feed material to a tumbling load of granuales. The application of the conclusions from this and other laboratory studies to the granulation and pelletization operations as practised industrially is discussed. (Author)
AD-656 129 Not available from CFSTI.

FORMATION OF ALKALI IRON SULFATES AND OTHER COMPOUNDS CAUSING CORROSION IN BOILERS AND GAS TURBINES.
Battelle Memorial Inst Columbus Ohio Columbus Labs
For primary bibliographic entry see Field 11F.
AD-656 366 HC$3.00 MF$0.65

IMMOBILIZED LIQUID MEMBRANES FOR CONTINUOUS CARBON DIOXIDE REMOVAL.
General Electric Co Schenectady N Y Research and Development Center
For primary bibliographic entry see Field 6K.
AD-656 785 HC$3.00 MF$0.65

REGENERATIVE CARBON DIOXIDE ADSORPTION SYSTEM USING CHARCOAL.
Bendix Corp Davenport Iowa Instruments and Life Support Div
For primary bibliographic entry see Field 6K.
AD-656 786 HC$3.00 MF$0.65

CHEMICAL ENGINEERING DIVISION SEMI-ANNUAL REPORT, JANUARY-JUNE 1966.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 15.
ANL-7225 HC$3.00 MF$0.65

LABORATORY INVESTIGATIONS IN SUPPORT OF FLUID-BED FLUORIDE VOLATILITY PROCESSES. PART XIV. THE CORROSION OF NICKEL AND NICKEL ALLOYS BY FLUORINE, URANIUM HEXAFLUORIDE, AND SELECTED VOLATILE FISSION PRODUCT FLUORIDES AT 500 DEGREES C,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 15.
ANL-7241 HC$3.00 MF$0.65

PREPARATION OF URANIUM MONOCARBIDE BY REACTION IN A LIQUID-METAL MEDIUM,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 15.
ANL-7301 HC$3.00 MF$0.65

ORMEF A FORTRAN CODE FOR COMPUTING DETAIL MULTI-EFFECT MULTI-STAGE FLASH EVAPORATION DESALINATION PLANT DESIGNS,
Oak Ridge National Lab., Tenn.
C. T. Mothershed. Aug 66, 128p
Contract W-7405-eng-26

Descriptors: (*Programming languages, *Desalination), (*Pilot plants, Design), Evaporation.

For abstract, see NSA 21 15.
ORNL-TM-1560 HC$3.00 MF$0.65

ABSTRACTS OF PAPERS, WATER AND DESALINATION INFORMATION MEETING, MARCH 28-29, 1967.
Oak Ridge National Lab., Tenn.
Mar 67, 77p
Contract W-7405-eng-26

Descriptors: (*Desalination, Abstracts), (*Water supplies, Reports), Chemical engineering, Civil engineering.

Group 7A—Chemical engineering

For abstract, see NSA 21 15.
ORNL-4115 HC$3.00 MF$0.65

LIQUID-VAPOR EQUILIBRIUM IN THE SYSTEM HELIUM-METHANE,
National Bureau of Standards, Boulder, Colo. Inst. for Materials Research.
C. K. Heck, and M. J. Hiza. 1967, 7p R-431
Published in AIChE Journal v13 n3 p593-9 1967.

Descriptors: (*Liquefied gases, Phase studies), (*Helium, Phase studies), (*Methane, Phase studies), Vapor pressure, Thermodynamics, Heat of solution, Chromatographic analysis, Concentration (Chemistry).

Liquid and gas phase compositions for the system helium-methane were measured at 15 deg. intervals from 95 to 185K. up to 200 atm. pressure. Data for these seven isotherms were taken in a gas phase recirculation apparatus with chromatographic analysis. In most regions the phase compositions obtained are thought to be within +3% or -3% of the mole fraction of the minor component. The maximum deviation from the enhancement factor curve at the lowest concentration levels was 16%. These data are in excellent agreement with most of the very recent data but are in poor agreement with the older data for this system. (Author)
PB-175 624 HC$3.00 MF$0.65

7B. Inorganic Chemistry

ACETONITRILE EXCHANGE RATES IN SOLUTIONS OF NICKEL (II) IONS BY NUCLEAR MAGNETIC RESONANCE,
Massachusetts Univ Amherst Dept of Chemistry
For primary bibliographic entry see Field 7D.
AD-655 859 Not available from CFSTI.

HYDRATION OF UNDISSOCIATED SALTS IN ACETONITRILE,
Minnesota Univ Minneapolis School of Chemistry
For primary bibliographic entry see Field 7D.
AD-655 860 Not available from CFSTI.

SPECTROGRAPHIC DETERMINATION OF TRACES OF IRON IN COPPER AND SILVER BY CARRIER DISTILLATION,
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
P. Tymchuk, J. A. H. Desaulniers, D. S. Russell, and S. S. Berman. 24 Mar 66, 5p
NRC-9495
Availability: Published in Applied Spectroscopy v21 n3 p151-4 May/Jun 1967.

Descriptors: (*Iron, Microanalysis), (*Copper, Spectroscopy), (*Silver, Spectroscopy), Vapors, Copper compounds, Chlorides, Purification, Sensitivity, Canada.
Identifiers: Cupric chloride.

A quantitative spectrographic method was developed for the determination of traces of iron in high-purity copper and silver. The use of copper chloride as a spectrographic carrier improves the sensitivity and enables the method to be used over a very wide range of concentrations. Samples containing from 0.004 to more than 150 micrograms of iron (0.07-2500 ppm) can be determined by the identical procedure. A series of 15 replicate copper samples containing 6.4 ppm iron yielded a coefficient of variation of 5.2%. The intensity of the iron spectrum is apparently independent of the copper or silver matrix, which greatly simplifies the preparation of calibration curves. Methods for the preparation of iron-free copper chloride and for purifying graphite electrodes are also outlined. (Author)
AD-655 873 Not available from CFSTI.

MIXED HETEROPOLY ACID FORMATION.
Final technical rept.,
Missouri Univ Columbia Dept of Chemistry
John C. Guyon. 11 Jul 67, 25p
AFOSR-67-1605
Grant AF-AFOSR-205-65

Descriptors: (*Complex compounds, Mixtures), (*Phosphorus compounds, Complex compounds), (*Inorganic acids, Complex compounds), Synthesis (Chemistry), Phosphoric acids, Spectroscopy, Molybdenum compounds, Catalysis, Thorium compounds, Microanalysis.
Identifiers: Heteropoly acids.

It was found that the Group IVB and VB elements all form simple heteropoly acid species, and that a variety of species previously thought to form mixed heteropoly acids, really form a mixture of simple heteropoly acids. Some interesting interactions, apparently catalytic, between the lower Group VA elements and the molybdate isopoly were observed. A new, sensitive spectrophotometric technique for determining micro amounts of thorium was developed. (Author)
AD-655 909 HC$3.00 MF$0.65

PREPARATION AND STRUCTURE OF (CH3SFe2 (CO)6)2S: AN ORGANOMETALLIC COMPLEX CONTAINING A TETRAHEDRAL-LIKE SULFUR ATOM COORDINATED TO FOUR METAL ATOMS,
Wisconsin Univ Madison Dept of Chemistry
Judith M. Coleman, Andrew Wojcicki, Philip J. Pollick, and Lawrence F. Dahl. 3 Oct 66, 10p
AFOSR-67-1659
Grant AF-AFOSR-518-66
Organometallic Sulfur Complexes, Part VIII. See also AD-655 896. Prepared in cooperation with Ohio State Univ., Columbus. Dept. of Chemistry.
Availability: Published in Inorganic Chemistry, n6 p1236 1967.

Descriptors: (*Metalorganic compounds, *Complex compounds), (*Sulfur compounds, Complex compounds), (*Iron compounds, Complex compounds), (*Metal carbonyls, Complex compounds), Molecular association, Molecular structure, Crystal structure, X-ray diffraction analysis, Symmetry (Crystallography), Valence, Synthesis (Chemistry).

The reaction of Fe3 (CO)12 with methyl thiocyanate has yielded as a condensation by-product the diamagnetic tetramer (CH3SFe2 (CO)6)2S. This complex was characterized by chemical and physical means including a three-dimensional single-crystal X-ray study which not only unambiguously established the actual composition but also revealed the first known example of an organometallic complex containing a tetrahedral-like sulfur atom bridging four metal atoms. The compound crystallizes with two molecules in a triclinic unit cell and of reduced cell parameters a = 8.93A, b = 9.28A, c = 16.04A, alpha = 81 deg. 40 min., beta = 80 deg. 5 min., gamma = 66 deg. 35 min. A full-matrix, anisotropic-isotropic, least-squares refinement has resulted in discrepancy factors of R1 = 9.1% and R2 = 9.3%. The molecular configuration of approximate C2-2 symmetry consists of two essentially identical (CH3SFe2 (CO)6) fragments bridged by a metal-coordinated tetrahedral-like sulfur atom which donates its six valence electrons to the four ion atoms. The properties and structural features are discussed and compared with those of (C2H5SFe (CO)3)2 and other related complexes. (Author)
AD-655 958 Not available from CFSTI.

SCANDIUM TITANITE AND SCANDIUM VANADITE, ScTiO3 AND ScVO3,
Cornell Univ Ithaca N Y Materials Science Center
A. F. Reid, and M. J. Sienko. 5 Aug 66, 7p
AFOSR-AFOSR-67-1628
Grant AF-AFOSR-796-65
Research supported in part by ARPA.
Availability: Published in Inorganic Chemistry v6 p521-4 1967.

Descriptors: (*Scandium compounds, Synthesis (Chemistry)), Titanium compounds, Vanadium compounds, Oxides, X-ray diffraction analysis, Magnetic properties, Band spectrum, Electrical conductance, Transport properties, Paramagnetic resonance.
Identifiers: Magnetic susceptability, Scandium titanites, Scandium vanadites, Titanites, Vanadites.

ScTiO3 was prepared by solid-state reaction of Sc2O3, TiO2, and Ti at 1700C; ScVO3, by reaction of Sc2O3 and V2O3 at 1500C and by reduction of ScVO4 with hydrogen at 950C. X-Ray intensities of ScTiO3 and ScVO3 closely correspond with those of Sc2O3, indicating a C-type R2O3 face-centered cubic structure. The magnetic susceptibility of ScVO3, measured by the Gouy method over the range 77-300K, shows normal paramagnetic behavior corresponding to mu-eff = 2.98 BM. The optical reflection spectrum of ScVO3, showing four bands at 4130, 9750, 13,900, and 20,200/cm, is consistent with V (3+) in lower than trigonal symmetry. ScTiO3 shows moderate powder conductivity, but its magnetic susceptibility indicates that most of the d1 electrons are localized on Ti (3+). The optical reflection spectrum of ScTiO3.00 shows a continuous absorption from 28,000 to 3800/cm, possibly superimposed on a Ti (3+) ligand-field absorption band at 20,000/cm. (Author)
AD-655 960 Not available from CFSTI.

KINETICS AND MECHANISM OF ACID HYDROLYSIS OF ETHYLENE BISBIGUANIDENICKEL (II) IONS.
Nevada Univ Reno Dept of Chemistry
For primary bibliographic entry see Field 7D.
AD-656 018 Not available from CFSTI.

NUCLEAR MAGNETIC RESONANCE STUDY OF BORATE-POLYBORATE EQUILIBRIA IN AQUEOUS SOLUTION,
Chicago Univ Ill Dept of Chemistry
For primary bibliographic entry see Field 7D.
AD-656 021 Not available from CFSTI.

SPECTROPHOTOMETRIC DETERMINATION OF BISMUTH,
Missouri Univ Columbia Dept of Chemistry
John C. Guyon, and Linda J. Cline. 1965, 5p
AFOSR-67-1697
Grant AF-AFOSR-205-63
Availability: Published in Analytical Chemistry v37 n13 p1778-8 Dec 1965.

Descriptors: (*Complex compounds, Bismuth compounds), (*Bismuth, Spectroscopy), Inorganic acids, Molybdates, Phosphoric acids, Colorimetric analysis, Sodium compounds, Sensitivity, Absorption spectrum.
Identifiers: Heteropoly acids, Molybdobismutho phosphates.

In a study of mixed heteropoly acid formation, the molybdobismutho phosphate method for bismuth was examined. A new heteropoly method was developed for bismuth. The technique described is based on the enhancement of the blue hue of reduced sodium molybdate by bismuth. The molar absorptivity of the new bismuth system is 2,000,000 at the 5-p.p.b. level, making this method some ten times more sensitive than existing photometric techniques. (Author)
AD-656 135 Not available from CFSTI.

SPECTROPHOTOMETRIC DETERMINATION OF ZIRCONIUM,

Missouri Univ Columbia Dept of Chemistry
John C. Guyon, and C. C. Clowers. 21 Jul 66, 4p
AFOSR-67-1707
Grant AF-AFOSR-205-63
Availability: Published in Analytica Chimica Acta v37 p401-2 1967.

Descriptors: (*Complex compounds, Zirconium compounds), (*Zirconium, Spectroscopy), Colorimetric analysis, Absorption spectrum, Inorganic acids, Molybdic acids, Sensitivity.
Identifiers: Heteropoly acids.

Results were previously published (Anal. Chem. v35 p1382 1963) of a study whose principal objective was to define the nature of the chemical reaction between zirconium (IV) and molybdenum (VI) in a sulfate medium between pH 1.0 and 2.0. The molar absorptivity of the resulting complex was 3,640. A large number of substances interfered in the color reaction. Results are now reported of an investigation designed to optimize the variables in this system and to achieve maximum sensitivity and selectivity with respect to zirconium. (Author)
AD-656 137 Not available from CFSTI.

RARE EARTH CHELATES OF 1,1,1,2,2,3,3-HEPTAFLUORO - 7,7 - DIMETHYL - 4,6 - OCTANEDIONE.
Doctoral thesis,
Aerospace Research Labs Wright-Patterson AFB Ohio
Charles S. Springer, Jr., Devon W. Meek, and Robert E. Sievers. 15 Jan 67, 10p Rept no. ARL-67-0132
Prepared for presentation in part at the National Meeting of the American Chemical Society, (152) New York, N. Y., Sep 1966.
Availability: Published in Inorganic Chemistry v6 p105-10 1967.

Descriptors: (*Chelate compounds, *Rare earth compounds), (*Halogenated hydrocarbons, Chelate compounds), Fluorine compounds, Ketones, Synthesis (Chemistry), Thermal stability, Spectra (Infrared), Nuclear magnetic resonance, Melting point, Molecular weight, Volumetric analysis, Gas chromatography, Thermogravimetric analysis.
Identifiers: Heptafluoro dimethyl octanediones.

Fifteen chelates of the ligand 1,1,1,2,2,3,3-heptafluoro-7,7-dimethyl-4,6-octanedione, H (fod), with trivalent rare earth metal ions were synthesized and investigated. The tris chelates are more volatile than any other known lanthanide compounds. The complexes were characterized by their elemental analyses, infrared and nuclear magnetic resonance spectra, melting points, molecular weights, and Karl Fischer titrations. All of the complexes (except that of Sc (III), which is anhydrous) are isolated as monohydrates which can be easily dehydrated in vacuo over P4O10. The complexes were studied by gas chromatography and thermogravimetric analysis. The results indicate an increase in volatility with a decrease in the radius of the central metal ion. (Author)
AD-656 160 Not available from CFSTI.

SPOT TEST DETECTION OF SULFIDE IN MINERALS,
Aerospace Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 8D.
AD-656 184 Not available from CFSTI.

REACTIONS OF SULFUR HEXAFLUORIDE WITH EXPLODING METALS,
University of the Witwatersrand Johannesburg (South Africa) Dept of Mechanical Engineering
Eileen Cook, and Bernard Siegel. Jun 67, 19p
Rept no. TR-1001 (2210)-10)-4
SSD-TR-67-109
Contract AF 04 (695)-1001

Descriptors: (*Exploding wires, Fluorination), (*Fluorides, Synthesis (Chemistry)), (*Sulfur compounds, Chemical reactions), Electric discharges, Thermochemistry, Gold, Platinum, Aluminum, Zirconium, Heat of reaction, Platinum compounds.
Identifiers: Platinous fluoride, Sulfur hexafluoride, Sulfur tetrafluoride.

Sulfur hexafluoride reacts with a number of electrically exploded metals to form sulfur tetrafluoride and a metal fluoride. The extent of reaction and the degree of utilization of the imparted electrical energy are shown to be related to reaction energetics and a physical model of the interactions between exploding metals and a surrounding gas. In each of the reactions that has been studied, reaction occurred only to the extent that the metal participated chemically. There was no self-pyrolysis of SF6 molecules, although sufficient energy had been provided for such pyrolysis to occur. The synthesis of PtF2 from exploding Pt and SF6 indicates that this technique offers promise as a method for preparing the lower fluorides of those transition metals that commonly exhibit a number of valences in their halides. (Author)
AD-656 312 HC$3.00 MF$0.65

ULTRATRACE ANALYSIS BY COORDINATION CHAIN REACTIONS.
Final rept. 1 Nov 64-31 Oct 66,
Purdue Univ Lafayette Ind Dept of Chemistry
Dale W. Margerum. Jul 67, 8p
AFOSR-67-1792
Grant AF-AFOSR-134-65

Descriptors: (*Microanalysis, *Complex compounds), Catalysis, Reaction kinetics, Instrumentation, Ethylenedinitrilo tetraacetates, Metals.

A summary is given of work intended to explore the analytical capabilities of a unique catalytic system including (1) ultratrace determination of metal ions, (2) selective ultratrace analysis, (3) automation of the method and (4) coupling of the reaction system in order to detect other trace species. In addition fundamental studies of the factors affecting the exchange rate of ligands coordinated to metal ions was continued. The application of this new kinetic method to ultratrace analysis was accomplished. As little as 10 to the -8th power M metal ions can be determined with 10% accuracy using manual techniques. Automatic measurement of the reaction rate constant permits analysis at the 0.01 ppm level within a few minutes. Stopped-flow mixing and an automated readout converts the transient photometric signal to a parameter which is a function of the trace metal present in the sample. The method is applicable to any metal capable of complexing EDTA. With pH control and the addition of masking agents the selective determination of metals is shown. The presence of 10 to the -8th power moles of dissolved O2 in water was detected by coupling reactions of O2 to the coordination chain reaction system. The complexation and therefore permit application of the extremely sensitive coordination chain system to the detection of many trace species. (Author)
AD-656 339 HC$3.00 MF$0.65

B6H10 PREPARATION.
Technical rept.,
Space-General Corp Los Angeles Calif Center for Research and Education
F. James Gerhart, and Robert E. Williams. 1 Jun 67, 9p Rept no. SGC-482-12
ONR-TR-12
Contract Nonr-4381 (00)

Descriptors: (*Boranes, Synthesis (Chemistry)), Pentaboranes, Ethers, Furans, Purification.
Identifiers: Hexaboranes.

A reappraisal of methods of hexaborane (10) production indicate that the best synthesis from B5H11 yields B6H10 in over 40% yield based upon the reaction: 2B5H11 yields B6H10 + by-products. (Author)
AD-656 593 Not available from CFSTI.

THE PHOTOCHEMISTRY OF BORAZINE. PREPARATION OF B-MONOHYDROXYBORAZINE, DIBORAZINYL ETHER AND B-MONOAMINOBORAZINE,
Cornell Univ Ithaca N Y Dept of Chemistry
For primary bibliographic entry see Field 7E.
AD-656 645 Not available from CFSTI.

GASEOUS BOROXINE: MECHANISM OF REACTION WITH BORON TRIHALIDES,
Cornell Univ Ithaca N Y Dept of Chemistry
M. Nadler, and Richard F. Porter. 26 Sep 66, 9p
AROD-4890:16-C
Contract DA-31-124-ARO (D)-320
Research supported in part by ARPA.
Availability: Published in Inorganic Chemistry v6 n6 p1192-6 Jun 1967.

Descriptors: (*Boron compounds, Chemical reactions), (*O-heterocyclic compounds, Chemical reactions), Boron compounds, Fluorides, Chlorine compounds, Bromine compounds, Reaction kinetics, Boranes, Oxides, Tracer studies, Spectra (Infrared).
Identifiers: Boroxins, B-heterocyclic compounds, Boron oxide, Dibromo boranes, Dichloro boranes, Difluoro boranes.

Low-pressure reactions of gaseous boroxine (H3B3O3) with boron trihalides to produce dihaloborane and boric oxide were studied by infrared absorption techniques. Kinetic data indicate that the reaction is close to first order in boroxine pressure. The pressure dependence of BF3 in the BF3-H3B3O3 reaction is close to zero order for BF3 pressures above 10 mm but tends toward a higher order at low pressures. Reactions are accelerated in cells coated with B2O3 (s). Reaction rates increase in the order BF3 < BCl3 < BBr3. Spectra of products of the reaction of 10B-labeled compounds show that the boron atoms in H3B3O3 appear in HBX2 and the boron atom in BX3 appears in B2O3 (s). A surface mechanism which accounts for the 10B distribution in the products is proposed. (Author)
AD-656 646 Not available from CFSTI.

REACTION OF N2 (A (3)SIGMA-m (+)) WITH ATOMIC NITROGEN,
Stanford Research Inst Menlo Park Calif
For primary bibliographic entry see Field 7D.
AD-656 667 Not available from CFSTI.

CHEMICAL ENGINEERING DIVISION SEMI-ANNUAL REPORT, JANUARY-JUNE 1966.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 15.
ANL-7225 HC$3.00 MF$0.65

SUMMARY OF THERMOPHYSICAL PROPERTIES OF POTASSIUM.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
H. H. Coe. Dec 65, 40p NASA-TN-D-3120

Descriptors: *Electric resistance, *Potassium, *Specific heat, *Thermoconductivity, *Vapor pressure, *Viscosity, Density, Electric, Enthalpy, Entropy, Heat, Liquid, Pressure, Property, Resistance, Saturation, Specific, Surface, Tension, Thermophysical, Vapor.

For abstract, see STAR 05 18.
N67-31919 HC$3.00 MF$0.65

THE CHEMISTRY AND LUMINESCENCE OF ANTIMONY- CONTAINING CALCIUM CHLORAPATITE.

Technische Hogeschool, Eindhoven (Netherlands).
A. H. Hoekstra. 6 Jun 67, 92p

Descriptors: *Antimony compound, *Calcium compound, *Chemical reaction, Antimony, Calcium, Chemical, Chemistry, Compound, Luminescence, Phosphate, Phosphor, Reaction.

For abstract, see STAR 05 18.
N67-32266 HC$3.00 MF$0.65

SECONDARY CHANGES IN THE STRENGTH OF CLAY LAYERS AND THE ORIGIN OF SENSITIVE CLAYS,
Stockholm Univ. (Sweden). Dept. of Quarternary Research.
For primary bibliographic entry see Field 8M.
PB-175 663 HC$3.00 MF$0.65

7C. Organic Chemistry

INFLUENCE DES EFFETS INDUCTIFS ET STERIQUES SUR LA BASICITE DES AMINES TERTIAIRES (Influence of the Inductive and Steric Effects on the Basicity of Tertiary Amines),
Canadian Armament Research and Development Establishment Valcartier (Quebec)
Guy Perrault. 28 Oct 66, 6p
Text in French.
Availability: Published in Canadian Journal of Chemistry v45 p1063-7 1967.

Descriptors: (*Amines, pH), (*Stereochemistry, Amines), Alcohols, Synthesis (Chemistry), Bases (Chemistry), Reaction kinetics, Molecular structure, Nuclear magnetic resonance, Canada.
Identifiers: Amino alcohols.

The following series of amino-beta-diols was prepared and characterized: alkyl-N-bis (hydroxy-2-butylamines, alkyl-N- (hydroxy-2-propyl, hydroxy-2-butyl) amines, alkyl-N- (hydroxy-2-ethyl, hydroxy-2-butyl) amines, and alkyl-N- (hydroxy-2-ethyl, hydroxy-2-propyl) amines. The pKa of these amines is proportional to the sum of the Taft constant (sigma*) of the various substituents, therefore proportional to the sum of the inductive effects, when these substituents contain a chain of less than six carbon atoms. For substituents having longer chains, a simple empirical relation was found for the steric effect (Es). This relation demonstrates that basicity is influenced by a combination of frontal hindrance and back-tension, the back-tension determining the degree of frontal hindrance.
AD-655 876 Not available from CFSTI.

PYRAMIDAL INVERSION OF SULFONIUM IONS. THE RACEMIZATION OF 1-ADAMANTYL ETHYLMETHYLSULFONIUM PERCHLORATE,
Princeton Univ N J Dept of Chemistry
Riccardo Scartazzini, and Kurt Mislow. 14 Apr 67, 7p
AFOSR-67-1737
Grant AF-AFOSR-1188-67
Availability: Published in Tetrahedron Letters n8 p2719-22 1967.

Descriptors: (*Organic sulfur compounds, *Stereochemistry), Molecular rotation, Polycyclic compounds, Perchlorates, Solvents.
Identifiers: Adamantyl ethyl methyl sulfonium perchlorates, Inversion reactions, Sulfonium compounds.

It was established that sulfonium salts racemize with pyramidal inversion, and under milder conditions than are required to effect inversion of similarly constituted phosphines and sulfoxides. Solvent effects may be implicated. (Author)
AD-655 946 Not available from CFSTI.

THE REACTION OF PHENYL (TRIHALOMETHYL)MERCURIALS WITH HEXAMETHYLDITIN. THE FIRST CASE OF DIHALOCARBENE INSERTION INTO A METAL-METAL BOND TO GIVE A STABLE MCX2M SYSTEM,
Massachusetts Inst of Tech Cambridge Dept of Chemistry
Dietmar Seyferth, and Frank M. Armbrecht, Jr.
15 Mar 67, 4p
AFOSR-67-1658
Grant AF-AFOSR-502-66
Availability: Published in Journal of the American Chemical Society v89 n11 p2790-1 May 24 1967.

Descriptors: (*Metalorganic compounds, Chemical reactions), (*Mercury compounds, Metalorganic compounds), (*Tin compounds, Metalorganic compounds), Halogenated hydrocarbons, Chlorine compounds, Bromine compounds, Chemical bonds, Iodine compounds.
Identifiers: Bis (trimethyltin) bromochloromethanes, Bis (trimethyltin) dichloromethane, Carbenes, Hexamethyl ditin, Phenyl (bromo dichloromethyl) mercurials, Phenyl (dibromo chloromethyl) mercurials.

Phenyl (trihalomethyl) mercurial-derived CCl2 and CClBr were found to insert into the Sn-Sn bond of hexamethylditin to give Me3SnCCl2SnMe3 and Me3SnCClBrSnMe3, respectively. The action of sodium iodide on the latter gave Me3SnClClSmMe3. (Author)
AD-655 957 Not available from CFSTI.

PREPARATION AND STRUCTURE OF (CH3SFe2 (CO)6)2S: AN ORGANOMETALLIC COMPLEX CONTAINING A TETRAHEDRAL-LIKE SULFUR ATOM COORDINATED TO FOUR METAL ATOMS,
Wisconsin Univ Madison Dept of Chemistry
For primary bibliographic entry see Field 7B.
AD-655 958 Not available from CFSTI.

ORGANOPHOSPHORUS CHEMISTRY. IV. THE REACTIONS OF TRIALKYL PHOSPHITES WITH ALPHA-HALO KETONES,
Yeshiva Univ New York Belfer Graduate School of Science
Irving J. Borowitz, Morris Anschel, and Steven Firstenberg. 28 Dec 66, 10p
AFOSR-67-1703
Grant AF-AFOSR-938-65
Prepared in cooperation with Lehigh Univ. Bethlehem, Pa.
Availability: Published in Journal of Organic Chemistry v32 p1723-9 Jun 1967.

Descriptors: (*Organic phosphorus compounds, Chemical reactions), Phosphates, Phosphites, Halogen compounds, Ketones, Cyclohexanones, Bromine compounds, Acetophenones, Acetic acids.
Identifiers: Keto phosphonates, Vinyl phosphates.

The publication deals with studies on the formation of vinyl phosphates which are unsaturated organophosphorus species. Such phosphorus compounds are often potent insecticides and are often toxic to higher forms of life. It is demonstrated that the reactions of alpha-haloketones with trialkyl phosphites can be controlled in some cases to give differing ratios of vinyl phosphates (the Perkow reaction) and another product with a carbon-phosphorus bond: a ketophosphonate. A number of new compounds of potential interest are described and the ways in which they may be formed chemically are discussed. Several formation pathways are eliminated from consideration and two reasonable pathways (one better than the other) are left. The novel effect of acetic acid in promoting vinyl phosphate formation is demonstrated. The publication lays the groundwork for more quantitative studies in the factors involved in oxygen-phosphorus and carbon-phosphorus bond formation. (Author)
AD-656 020 Not available from CFSTI.

DITRIDECYL PHTHALATE (DTDP) IN HIGH TEMPERATURE VINYL INSULATION,
Enjay Labs Linden N J
W. A. Dimler, Jr. 1959, 12p
Prepared for presentation at the Annual Wire and Cable Symposium, Asbury Park, N. J., December 1959.

Descriptors: (*Phthalates, Plasticizers), (*Vinyl plastics, *Plasticizers), Electric insulation, Aging (Materials), Plastic coatings, Esters, Alcohols, Anhydrides, Barrier coatings, Polyvinyl chloride.
Identifiers: Ditridecyl phthalate, Decyl tridecyl phthalate, Ditridecyl adipate.

Phthalates based on oxo alcohols meet most vinyl insulation needs. Tridecyl alcohol esterifies readily with phthalic anhydride. DTDP-plasticized vinyl insulation passes the heat-aging requirements for 90 and 105 degrees wire. Other areas for DTDP-plasticized insulation include TW, THW, 60C, oil-resistant, and jacketing compounds. Decyl tridecyl phthalate and ditridecyl adipate are esters that should also be of interest as specialty plasticizers. (Author)
AD-656 247 HC$3.00 MF$0.65

INTERNATIONAL SYMPOSIUM ON FREE RADICALS (7th), PADUA, ITALY, SEPTEMBER 5-10, 1965,
Padua Univ (Italy)
For primary bibliographic entry see Field 7D.
AD-656 392 HC$3.00 MF$0.65

SYNTHESIS OF CARBORANE MODIFIED FLUOROCARBON ELASTOMERS.
Army Weapons Command Rock Island Ill Research and Engineering Div
For primary bibliographic entry see Field 11J.
AD-656 455 HC$3.00 MF$0.65

7D. Physical Chemistry

ELECTROCHEMICAL STUDIES IN THE SYNTHESIS OF N-F COMPOUNDS.
Quarterly status rept. no. 5, 1 Jan-31 Mar 64,
Tracor, Inc., Austin, Tex.
Larry G. Spears, Larry D. Fiel, Wallace E. Harrell, Jr., and Gerhard M. Schmid. 9 Jul 64, 40p
Rept. no. 64-228-U
Contract Nonr-4054 (00), ARPA Order-399

Descriptors: (*Fluoroamines, Synthesis (Chemistry)), (*Fluorination, Electrodes), (*Fluorine compounds, Synthesis (Chemistry)), (*Electrochemistry, Fluorination), (*Anodes (Electrolytic cell), Fluorination), Nitrogen compounds, Hydrogen compounds, Ammonia, Hydrazine, Materials, Nickel alloys, Metals, Electrolytic cells, Halocarbon plastics, Ammonium compounds, Polarization, Corrosion, Antimony, Bismuth, Silver, Aluminum, Copper, Iron, Cobalt.

The report describes work which was devoted to the development of a suitable working electrode for use in electrochemical fluorination studies in anhydrous HF (AHF). Investigations of possible working electrodes involved antimony, bismuth, silver, aluminum, titanium, cobalt, iron, and monel. Antimony, bismuth, and silver show a high anodic dissolution rate in AHF, while the other metals studied show passive behavior. Of the latter metals only monel formed a protective coating which permitted appreciable fluorine evolution to occur. (Author)
AD-442 627 HC$3.00

ACETONITRILE EXCHANGE RATES IN SOLUTIONS OF NICKEL (II) IONS BY NUCLEAR MAGNETIC RESONANCE,
Massachusetts Univ Amherst Dept of Chemistry
David K. Ravage, Thomas R. Stengle, and Cooper H. Langford. 7 Oct 66, 5p
AFOSR-67-1687
Grant AF-AFOSR-212-65
Availability: Published in Inorganic Chemistry v6 n6 p1252-4 Jun 1967.

Descriptors: (*Complex compounds, *Nuclear magnetic resonance), (*Acetonitriles, Exchange reactions), (*Nickel, Exchange reactions), Reaction kinetics, Heat of activation, Solvents, Relaxation time.

Observations of the transverse relaxation times of proton nuclear magnetic resonance spectra of acetonitrile solutions of Ni (II) carried out over a substantial temperature range permit determination of rates and activation parameters for the rapid exchange reaction between bulk solvent molecules and solvent molecules coordinated to the paramagnetic ions. The parameters for the exchange at 25C are: k = 2800/sec, heat of activation = 11.7 kcal/mol, and entropy of activation = 3.6 cal/deg. The contact chemical shift of the solvent was studied over a large temperature range, and a value of the contact constant derived as A/h = -81000 cps. (Author)
AD-655 859 Not available from CFSTI.

HYDRATION OF UNDISSOCIATED SALTS IN ACETONITRILE,
Minnesota Univ Minneapolis School of Chemistry
I. M. Kolthoff, and M. K. Chantooni, Jr. 6 Jan 67, 6p
AFOSR-67-1685
Grant AF-AFOSR-28-65
Availability: Published in Journal of the American Chemical Society v89 n11 p2521-4 May 24 1967.

Descriptors: (*Acetonitriles, Solutions), (*Hydrates, Reaction kinetics), Potassium compounds, Salts, Salicylates, Benzoates, Dissociation, Solubility, Chemical equilibrium.
Identifiers: Potassium dinitrobenzoates, Potassium dinitrophenolates, Potassium picrate, Potassium salicylate.

An equation was derived to calculate--from the total and ionic solubilities of potassium picrate, salicylate, 3,5-dinitrobenzoate, and 3,5-dinitrophenolate in acetonitrile in the presence of known concentrations of water--the individual formation constants of dissolved, undissociated mono- and dihydrated salts. Using these values and the previously determined values of formation constants of hydrated ions in acetonitrile, it was possible to calculate the concentration of all species present in saturated solutions of the above salts in the presence of water. This allowed calculation of the ionic dissociation constant of monohydrated, dissolved salt which was found to be greater than that of the unhydrated, dissolved salt. Unexplained is the result that the dissociation constant of dihydrated potassium salicylate was found smaller than the corresponding constant of the anhydrous salt. In the presence of water the dissociation constant of the anhydrous salt was found to be virtually unaffected up to a water concentration of 0.6M. The red solid salt, potassium 3,5-dinitrophenolate, changes into a yellow solid in the presence of small concentrations of water in AN. This solid was found to be a monohydrate. No hydrated solid was formed with the other salts used. The ionic dissociation constant of the monohydrate was found greater than that of the anhydrous salt, while the constant of the dihydrate was found considerably greater than that of the monohydrate. (Author)
AD-655 860 Not available from CFSTI.

BEHAVIOR OF ULTRA-SMALL COLLOID PARTICLES,
Thiokol Chemical Corp Denville N J Reaction Motors Div
Ronald Caruso. Jun 67, 45p
AFOSR-67-0933
Contract AF 49 (638)-1675

Descriptors: (*Colloids, *Alumina), Particles, Preparation, Flames, Metalorganic compounds, Particle size, Emissivity, Intensity, Scattering.

The program is an investigation of the growth and agglomeration behavior of ultra-small metal oxide particles such as Al2O3 or BeO particles which are 10 to 10,000A in diameter. Initial work on this program was oriented toward Al2O3 particles. A premixed flat flame at low sub-atmospheric pressures (2-16 torr) was examined as a technique for generating a cloud of Al2O3 particles. Al (CH3)3 and O2 or air were used. Electron microscopy indicated the formation of 50 and 100A diameter particles in the O2 and air systems, respectively. Extinction and scattering techniques for measuring size and concentration in situ in the particle cloud were unsuccessful because the cloud was optically very thin at such low pressures. Particle and gas temperatures were measured by radiation and reversal techniques and were both about 2300K in the second reaction zone, indicating no hot particle-cool vapor problem. Absolute intensity measurements of the continuum radiation being emitted from the hot particles in the burned-gas zone indicated that no growth of the particles was occurring in the burned-gas zone. The measured absorption coefficient of the molten aluminum oxide, 30/mm at 1.5 microns, is comparable to that observed for molten sapphire. (Author)
AD-655 906 HC$3.00 MF$0.65

CERTAIN COLLISIONS BETWEEN PROTONS AND DIATOMIC MOLECULES.
Physical Studies Inc Reno Nev
For primary bibliographic entry see Field 20H.
AD-655 911 HC$3.00 MF$0.65

SOLID-STATE AND MOLECULAR THEORY GROUP.
Massachusetts Inst of Tech Cambridge
For primary bibliographic entry see Field 20L.
AD-655 966 HC$3.00 MF$0.65

GROUND STATES OF SIGMA-BONDED MOLECULES. I. A SEMIEMPIRICAL SCF MO TREATMENT OF HYDROCARBONS,
Texas Univ Austin Dept of Chemistry
Michael J. S. Dewar, and Giles Klopman. 28 Jan 67, 13p
AFOSR-67-1733
Grant AF-AFOSR-1050-67
Availability: Published in Journal of the American Chemical Society v89 n13 p3089-98 Jun 21 1967.

Descriptors: (*Molecular orbitals, *Hydrocarbons), Heat of formation, Chemical bonds, Valence, Ground state, Integrals, Ionization potentials, Dipole moments.

In a recent series of papers it was shown that the heats of formation of conjugated molecules can be calculated with surprising accuracy by the Pople SCF MO method, the bonds being treated as localized. A description is now given of an extension of the method to include all the valence electrons in a molecule, using procedures similar to those suggested by Pople, Santry, and Segal and by Klopman. Preliminary calculations for a number of hydrocarbons are reported; the agreement between the calculated and observed heats of formation is already very satisfactory, implying that this approach should ultimately give results of sufficient accuracy to be of value in predicting the structures and reactivities of molecules. (Author)
AD-655 969 Not available from CFSTI.

MEASUREMENT OF PARALLEL (SOLLER) SLITS WITH A MODIFIED WEISSENBERG GONIOMETER.
Revised ed.,
Philips Labs Briarcliff Manor N Y
William Parrish. 5 Jan 67, 4p
AFOSR-67-1755
Contract AF 49 (638)-1234
Revision of manuscript submitted 16 Nov 66.
Availability: Published in The Review of Scientific Instruments v38 n5 p697-8 May 1967.

Descriptors: (*Goniometers, *X-ray spectroscopy), X-ray diffraction analysis, Sensitivity, Instrumentation, Visual inspection, Fluorescence, Intensity, Measurement, Scintillation counters, X-ray tubes.

Parallel slit assemblies limit the axial divergence in x-ray powder diffractometry and determine the line breadth in x-ray fluorescence spectroscopy. Poor assemblies with bent foils or wedge-shaped spacers cause a loss of intensity and no gain in resolution. It is difficult to determine the quality of assemblies from visual examination, and attempts to check the assemblies with x rays by placing a dental film over the end of the assembly were not successful. The Weissenberg method described below is simple and provides information on the quality of the individual foils and the entire assembly. (Author)
AD-655 984 Not available from CFSTI.

RADICAL CONCENTRATIONS AND DECAYS IN LEAN HYDROGEN-NITROGEN-OXYGEN FLAMES.
Canterbury Univ Christchurch (New Zealand) Dept of Chemistry
For primary bibliographic entry see Field 21B.
AD-655 989 Not available from CFSTI.

EFFECT OF PRESSURE ON THE DIFFUSION OF Fe IN Ti + 10% Fe,
Illinois Univ Urbana Dept of Mining Metallurgy and Petroleum Engineering
For primary bibliographic entry see Field 11F.
AD-655 996 Not available from CFSTI.

ORDERING IN LIQUID CRYSTALS OWING TO ELECTRIC AND MAGNETIC FIELDS,
Maine Univ Orono Dept of Physics
Edward F. Carr. 11 Feb 66, 16p
AFOSR-67-1779
Grant AF-AFOSR-605-64
Availability: Published in Advances in Chemistry n63 p76-88 1967.

Descriptors: (*Crystals, Liquids), (*Organic nitrogen compounds, *Molecular association), (*Phenyl ethers, Molecular association), Electric fields, Magnetic fields, Moments, Polarization, Dielectric properties, Anisotropy, Microwave frequency.
Identifiers: Anisal aminoazobenzenes, Azoxy anisoles.

A great deal of work has been carried out using electric fields to align molecules in the anisotropic liquid phase, and the results have often been conflicting. Results are shown for anisal-p-aminoazobenzene, which exhibits positive dielectric anisotropy, and for p-azoxyanisole, which exhibits negative dielectric anisotropy. The molecular alignment was investigated in the presence of external electric and magnetic fields acting individually and also simultaneously. Measurements of the dielectric loss at a microwave frequency were used to indicate the extent of the ordering. The results indicate the existence of a process causing molecular alignment which depends on the electric or magnetic field but is not associated with either the anisotropy in the dielectric constant or the permeability. (Author)
AD-655 997 Not available from CFSTI.

STOPPING CROSS SECTIONS IN BORON OF LOW ATOMIC NUMBER ATOMS WITH ENERGIES FROM 15 TO 140 keV,

Mcmaster Univ Hamilton (Ontario) Dept of Physics
For primary bibliographic entry see Field 20H.
AD-655 999 Not available from CFSTI.

PERTURBATION THEORY EXPANSIONS THROUGH 20TH ORDER OF MASS POLARIZATION CORRECTION, RELATIVISTIC EFFECTS AND LAMB SHIFT OF THE TWO-ELECTRON SYSTEM (1s)2 1S,
Oslo Univ (Norway) Inst for Theoretical Physics
John Midtdal, and Kjell Aashamar. 2 May 66, 13p
AFOSR-67-1653
Grant AF-EOAR-33-66
Availability: Published in Physica Norvegica v2 n2 p99-109 1967.

Descriptors: (*Helium, Atomic energy levels), (*Atomic energy levels, Perturbation theory), Field theory, Wave functions, Atomic orbitals, Polarization, Line spectrum, Relativity theory, Operators (Mathematics), Ionization potentials, Tables, Norway.
Identifiers: Lamb shift.

A 20th-order perturbation wave function given previously for the two-electron system (1s)2 1S was used to compute perturbation expansion coefficients through 20th order of the mass polarization correction, the relativistic effects, the Lamb shift and a number of additional operators. Expectation values of the energy corrections, as well as of the total ionization energies, are given in tabulated form for the 20 first members of the helium isoelectronic sequence. (Author)
AD-656 002 Not available from CFSTI.

KINETIC EQUATIONS AND DENSITY EXPANSIONS: EXACTLY SOLVABLE ONE-DIMENSIONAL SYSTEM,
Yeshiva Univ New York Belfer Graduate School of Science
Joel L. Lebowitz, and Jerome K. Percus. 26 Aug 66, 19p
AFOSR-67-1747
Grant AF-AFOSR-508-66
epared in cooperation with New York Univ., N. Y., Courant Inst. of Mathematical Sciences.
Availability: Published in The Physical Review v155 n1 p122-38 Mar 5 1967.

Descriptors: (*Kinetic theory, Statistical mechanics), Gases, Transport properties, Distribution functions, Mathematical models, Dynamics, Particles.
Identifiers: Autocorrelation of functions, Boltzmann equation.

We have made a detailed study of the time evolution of the distribution function f (q,v,t) of a labeled (test) particle in a one-dimensional system of hard rods of diameter a. The system has a density rho and is in equilibrium at t=0. When the distribution function f at t=0 corresponds to a delta function in position and velocity, then f (q,v,t) is essentially the time-displaced self-distribution function fs. This function fs and all of the system properties which can be derived from it depend on rho and alpha only through the combination n=rho/ (1-rho a). Any attempt to write a Bogoliubov, Choh-Uhlenbeck-type Markoffian kinetic equation as a power series in the density leads to divergence in the terms beyond the Boltzmann equation. A Markoffian collision operator can, however, be constructed, without using a density expansion, which, e.g., describes the stationary distribution of a charged test particle in the system in the presence of a constant electric field. The distribution of the test particle in the presence of an oscillating external field is also found. Finally, the short- and long-time behavior of the self-distribution is examined.
AD-656 012 Not available from CFSTI.

ENSEMBLE DEPENDENCE OF FLUCTUATIONS WITH APPLICATION TO MACHINE COMPUTATIONS,
Yeshiva Univ New York Belfer Graduate School of Science
Joel L. Lebowitz, Loup Verlet, and Jerome K. Percus. 18 Aug 66, 7p
AFOSR-67-1775
Grant AF-AFOSR-508-66
Prepared in cooperation with New York Univ., N. Y., Courant Inst. of Mathematical Sciences.
Availability: Published in The Physical Review v153 n1 p250-4 Jan 5 1967.

Descriptors: (*Kinetic theory, Statistical mechanics), Particles, Transformations (Mathematics), Transport properties, Distribution functions, Dynamics, Thermodynamics, Specific heat, Temperature, Equations of state.

The standard theory of fluctuations in thermodynamic variables in various ensembles is generalized to nonthermodynamic variables: e.g., the mean-square fluctuations of the kinetic energy K in a classical microcanonical ensemble at fixed energy E is given, for large systems, by (delta K)squared/K = T (1-3/2c), where T is the temperature (corresponding to the energy E) and C is the specific heat per particle (in units of Boltzmann's constant). The general results may be expressed in terms of the asymptotic behavior of the Ursell functions in various ensembles. Applications are made to molecular dynamic computations where time averages correspond (via ergodicity) to phase averages in an ensemble with fixed energy and momentum. The results are also useful for time-dependent correlations. (Author)
AD-656 013 Not available from CFSTI.

KINETICS AND MECHANISM OF ACID HYDROLYSIS OF ETHYLENE BISBIGUANIDENICKEL (II) IONS.
Revised ed.,
Nevada Univ Reno Dept of Chemistry
D. J. McDonald. 24 Oct 66, 11p
AFOSR-67-1789
Grant AF-AFOSR-994-66
Revision of manuscript submitted 5 Aug 66.
Availability: Published in J. Inorg Nucl Chem v29 p1271-8 1967.

Descriptors: (*Complex compounds, Hydrolysis), (*Nickel compounds, Complex compounds), Ethylenes, Guanidines, Reaction kinetics, pH, Dissociation, Chemical equilibrium, Enthalpy, Entropy, Heat of activation.
Identifiers: Ethylene bis (biguanidine)nickel compounds.

The rate of decomposition of the square-planar low-spin ethylene bisbiguanidenickel (II) complex ion in acidic aqueous solution has been measured at 25, 40 and 55C over a range of pH values. The observed rate law is -d (complex conc.)dt = k2 (complex conc.) (H (+)conc.) + k3 (complex conc.) (H (+)conc.)sq., which agrees with a proposed mechanism involving a unimolecular dissociation of the ligand from the nickel (II) ion and a protonation equilibrium. At 25C, k2 = 0.270 + 0.0085 or -0.0085/M/sq sec and k3 = 128 + 5.3 or -5.3/sq M/sec. For k2, Delta H2 (++) = 1.27 + 0.2 or -0.2 kcal and Delta S2 (++) = -11.5 + 0.7 or -0.7 e.u. For k3, Delta H3 (++) = 2.57 + 0.4 or -0.4 kcal and Delta S3 (++) = -4.9 + 1.3 or -1.3 e.u.
AD-656 018 Not available from CFSTI.

NUCLEAR MAGNETIC RESONANCE STUDY OF BORATE-POLYBORATE EQUILIBRIA IN AQUEOUS SOLUTION,
Chicago Univ Ill Dept of Chemistry
Robert K. Momii, and Norman H. Nachtrieb. 29 Nov 66, 6p
AFOSR-67-1701
Grant AF-AFOSR-1086-66
Availability: Published in Inorganic Chemistry v6 n6 p1189-92 Jun 1967.

Descriptors: (*Borates, *Polymerization), Chemical equilibrium, Nuclear magnetic resonance, Sodium compounds, Potassium compounds, Line spectrum, Concentration (Chemistry), Dissociation.

The nuclear magnetic resonance of B11 in aqueous solutions of boric acid and alkali meta- and polyborate salts provides information on their polymerization equilibria. Solutions of mononuclear species yield one-line spectra that show no chemical shift with concentration. Two B11 lines are observed in aqueous sodium pentaborate, whose relative amplitudes (but not resonance frequencies) are concentration dependent. Solutions of sodium and potassium tetraborates give one-line spectra that broaden and shift upfield with concentration; at low concentrations their dissociation into monoborate anions is complete, and at high concentration several polyborate ion species exist. (Author)
AD-656 021 Not available from CFSTI.

THE OXIDATION AND PYROLYSIS OF ETHYLENE IN SHOCK WAVES,
Harvard Univ Cambridge Mass Dept of Chemistry
John B. Homer, and G. B. Kistiakowsky. Jul 67, 28p
Contract Nonr-1866 (36)

Descriptors: (*Ethylenes, Thermochemistry), Shock tubes, Oxidation, Pyrolysis, Spectra (Infrared), Reaction kinetics, Heat of activation, Alkynes, Carbon monoxide, Carbon dioxide, Hydrogen.

The oxidation of C2H4 was studied in a shock tube by monitoring the infrared emissions from CO and CO2 and the visible emission from CH*. The characteristics of this oxidation closely resemble oxidations of C2H2 and C2H2 + H2. The induction periods and exponential time constants for the early phase of CO formation are the same for all three oxidations over the temperature range of 1500K to 2300K and lead to a common activation energy of 17 +1 or -1 kcal/mole. Above 1800K, the C2H4 - O2 reaction, in its early stages, consists mainly of the pyrolysis of C2H4, and the concurrent oxidation of pyrolysis products, C2H2 and H2. Later in the reaction, and more prominently so at lower temperatures, the reaction changes in character to a slower direct oxidation of C2H4. The relative rates of CO and CO2 production in both C2H4 - O2 and C2H2 - O2 reactions are reported as a function of temperature. The pyrolysis of C2H4 was also studied in the shock tube by an infrared technique and its rates determined between 1950K and 2250K. The results give an activation energy of 52 kcal/mole for the reaction. The oxidation results would indicate that C2H4, above 1800K, decomposes mainly by a molecular rather than a radical mechanism. (Author)
AD-656 040 HC$3.00 MF$0.65

CORRECTION FOR DOUBLE LAYER CHARGING DURING STRIPPING OF ADSORBED LAYERS.
Interim technical rept. no. 1,
Tyco Labs Inc Waltham Mass
S. B. Brummer. May 67, 21p
Contract N00014-66-C-0210
Submitted for publication in Journal of Physical Chemistry nd.

Descriptors: (*Electrical double layer, Capacitance), Electrodes, Absorption, Electrolytes, Reaction kinetics.

The differential double layer capacity for electrodes covered with adsorbed layers is usually lower than for the clean electrode in the base electrolyte. Because of this, there is a wide belief that subtracting the base electrolyte capacity leads to

a significant 'over-correction' for double layer charging in estimating adsorbate coverages by stripping methods. It is shown that no error occurs if charge integration both for the base electrolyte and for the adsorbate-containing solution is carried out from the respective points of zero charge (PZC) to a potential where no adsorption occurs. In practice, with solid electrodes, a small 'under-correction' for double layer effects (1 - 3%) is introduced because the PZC is not readily experimentally accessible. Large double layer charging errors can occur on analyzing the kinetics of the stripping process, however, to overcome these, a novel experiment involving the measurement of the double layer capacity during the stripping process was suggested. Whilst the zero frequency capacity is the most appropriate for adsorbate analysis, it cannot be measured in practice. The experiment suggested allows use of the infinite frequency capacity, which is experimentally accessible. (Author)
AD-656 044 Not available from CFSTI.

THE CORRECTION FOR ELECTRODE OXIDATION DURING THE ANODIC ESTIMATION OF ADSORBATE COVERAGE ON SMOOTH Pt ELECTRODES.
Interim technical rept. no. 2,
Tyco Labs Inc Waltham Mass
S. B. Brummer, and Kathleen Cahill. May 67, 27p
Contract N00014-66-C-0210
See also AD-656 044.
Availability: Submitted for publication in Journal of Electroanalytical Chemistry nd.

Descriptors: (*Electrodes, Surface properties), (*Platinum, Electrodes), Carbon dioxide, Adsorption, Test methods, Oxidation-reduction reactions, Anodes (Electrolytic cell), Electrolytes, Sulfuric acid.

'Reduced CO2' adsorbed on smooth Pt electrodes from 1 M H2SO4 solutions at 40C has been used as a model system to investigate the anodic charging methods of estimating adsorbates. Three methods have been compared: the usual 'direct' method and two variations of the previously-developed current reversal method. The useful ranges of experimental application of these different methods for estimating adsorbate coverage are discussed. (Author)
AD-656 048 Not available from CFSTI.

TEST OF THE DIRECT INTERACTION MODEL FOR ATOMIC REACTIONS: CORRELATION OF THE OUTGOING ELECTRONS IN ELECTRONIC IONIZATION.
Technical rept.,
New York Univ N Y Dept of Physics
A. E. Glassgold. 1967, 10p Rept no. TR-67-2
Contract Nonr-285 (58)

Descriptors: (*Gas ionization, Theory), (*Electron bombardment, Theory), Atoms, Electrons, Interactions, Scattering, Atomic orbitals, Experimental design.

In the classical theories, as well as in the Born approximation, it is assumed that an atomic reaction initiated by an electron proceeds by way of a single collision with one of the target electrons. This is named the Direct Interaction Model (DIM), adopting the terminology from nuclear physics. The purpose of the paper is to propose an experimental test of this model for atomic reactions.
AD-656 052 HC$3.00 MF$0.65

THE ENERGETICS OF ION TRANSPORT IN THE PRESENCE OF POLYMERIC COMPOUNDS WHICH ALTER THE RHEOLOGICAL PROPERTIES OF WATER.
Technical rept.,
Little (Arthur D) Inc Cambridge Mass
R. A. Horne, H. F. Eden, and R. P. Young. 11 Aug 67, 7p Rept no. TR-30
Contract Nonr-4424 (00)

Descriptors: (*Water, *Molecular association), Rheology, Viscosity, Additives, Polymers, Vinyl plastics, Epoxy plastics, Heat of activation, Potassium compounds, Chlorides, Electrical conductance, Electrolytes, Transport properties.
Identifiers: Drag-reducing fluids.

The Arrhenius activation energy of the electrical conduction of aqueous 0.10M KCl solution remains unchanged when a thickening agent such as polyvinylmethel ether or a drag-reducing agent such as polyethylene oxide is added, indicating that these agents, in the small amounts added, probably do not appreciably alter the structure of liquid water. (Author)
AD-656 058 HC$3.00 MF$0.65

SMOLUCHOWSKI EQUATION FOR SYSTEMS WHICH DO NOT OBEY THE STOKES-EINSTEIN RELATION.
Master's thesis,
Aerospace Research Labs Wright-Patterson AFB Ohio
James H. Gorrell, Jr., and Jean T. Bubois. 19 Sep 66, 13p Rept no. ARL-67-0088
Availability: Published in Transactions of the Faraday Society v63 n530 Pt2 p347-54 Feb 1967.

Descriptors: (*Polycyclic compounds, Excitation), (*Fluorescence, Equations), (*Diffusion, Equations), (*Reaction kinetics, Equations), Naphthalenes, Phenanthrenes, Molecular energy levels, Quenching (Inhibition), Solvates, Acetones, Pentanones, Butanones.
Identifiers: Biacetyl, Biphenyl, Chrysenes.

Experimental rate constants for the transfer of electronic excitation energy from naphthalene, phenanthrene and chrysene to biacetyl were obtained in hexadecane, from the measured quenching coefficients and the directly measured lifetimes. These rate constants were compared with rate constants calculated from the Smoluchowski equation using measured diffusion coefficients and assuming that the transfer radii are of similar magnitude as the kinetic radii. Diffusion coefficients for biphenyl, acetone, methyl ethyl ketone and diethyl ketone were also measured in hexadecane at 30C and compared with values estimated by various theoretical and semi-empirical relations. (Author)
AD-656 156 Not available from CFSTI.

INTRAMOLECULAR ISOMERIZATION OF OCTAHEDRAL COMPLEXES BY MECHANISMS NOT INVOLVING BOND RUPTURE,
Aerospace Research Labs Wright-Patterson AFB Ohio
Charles S. Springer, Jr., and Robert E. Sievers.
12 Aug 66, 7p Rept no. ARL-67-0095
Availability: Published in Inorganic Chemistry v6 n4 p852-4 Apr 1967.

Descriptors: (*Complex compounds, *Molecular isomerism), Stereochemistry, Chemical bonds, Configuration, Chelate compounds, Heat of activation.

The Bailar twist is shown to be a very general intramolecular nonbond rupture mechanism which can account for both optical and geometrical isomerization of octahedral complexes. Any actual intramolecular isomerization mechanism not involving bond rupture in all likelihood lies somewhere between the ideal Bailar mechanism and the rigidring cases. It would seem that in chelate molecules with particularly rigid rings the fixed-ring mechanisms might be preferred, while those with less rigid ligands or with particularly bulky substituents might follow the more flexing Bailar pathway. Finally, the activation energies for the rigid- and flexing-ring cases, though probably of similar values, must be different. Energy may be either released or expended in flexing the rings, and the ligand electrostatic repulsion energy must be different for the two possible shapes of transition states.
AD-656 157 Not available from CFSTI.

ELECTRICAL PROPERTIES AND DEFECT STRUCTURE OF A (0.13 YO1.5 . 0.87 ThO2) ELECTROLYTE.
Aerospace Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 11B.
AD-656 185 Not available from CFSTI.

THE HEAT CAPACITY OF CU (NO3)2.25H2O AT LOW TEMPERATURES,
Carnegie Inst of Tech Pittsburgh Pa Dept of Physics
For primary bibliographic entry see Field 20M.
AD-656 224 Not available from CFSTI.

FILLER STUDY IN CROSS-LINKED POLYETHYLENE,
Vanderbilt (R T) Co Inc East Norwalk Conn Rubber Div
For primary bibliographic entry see Field 11I.
AD-656 233 HC$3.00 MF$0.65

MEASUREMENT OF THE DEGREE OF DISPERSION OF CARBON BLACK IN POLYETHYLENE USING ABSORPTION OF LIGHT,
Battelle Memorial Inst Columbus Ohio
For primary bibliographic entry see Field 11I.
AD-656 280 HC$3.00 MF$0.65

EFFECTS OF PLASTICIZERS UPON DRY BLENDING POLYVINYL CHLORIDE RESINS,
Firestone Plastics Co Pottstown Pa
For primary bibliographic entry see Field 11I.
AD-656 286 HC$3.00 MF$0.65

EXPERIMENTAL STUDY OF CHEMI-IONIZATION.
Final scientific rept. 1 May 65-30 Apr 67,
Louvain Univ (Belgium) Lab of Inorganic Chemistry
A. Van Tiggelen, and S. de Jaegere. May 67, 45p
ARL-67-0155
Grant AF-EOAR-82-65

Descriptors: (*Flames, Gas ionization), (*Photolysis, Gas ionization), (*Gas ionization, Reaction kinetics), Methane, Oxygen, Recombination reactions, Concentration (Chemistry), Potassium, Alkynes, Nitrogen oxides, Explosive gases, Mass spectrum, Belgium.

Ions were identified and their concentration was measured for an atmospheric methane-oxygen flame. The ion-electron recombination coefficient was derived: a = 1.9 plus or minus 0.0000001 cu cm/sec. Reaction mechanisms responsible for the ion formation are proposed. The rate constant of the electron-transfer reaction K + H3O (+) to K (+) + H2O + H was evaluated: ke = 4.6 x 10 to the -8th cu cm/sec. The number of ions produced per carbon atom was evaluated for the mentioned flame as a function of the equivalence ratio and of the flame temperature. The accuracy and the measuring range of the apparatus for flash conductimetry was greatly improved. A description is given of these improvements. The determination of electron concentrations from flashconductimetric data is discussed. Ion-electron recombination reactions were studied in explosive methane-oxygen-nitrogen dioxide mixtures. A recombination coefficient of 4,25 x 0.0000001 cu cm/sec is suggested for the recombination of NO (+) with electrons. (Author)
AD-656 343 HC$3.00 MF$0.65

Group 7D—Physical chemistry

BOUND STATES OF AN ELECTRON IN A DIPOLE FIELD,
Queen'S Univ Belfast (Northern Ireland) School of Physics and Applied Mathematics
O. Crawford, and A. Dalgarno. 14 Dec 66, 1p
Contract N62558-4297
Availability: Published in Chemical Physics Letters v1 p23 1967.

Descriptors: (*Dipole moments, Interactions), Molecular orbitals, Electrons, Potential energy, Scattering, Great Britain.

It is shown that for dipole moments less than certain critical values there exist no bound states for electrons moving in the field of a fixed or a rotating electric dipole. (Author)
AD-656 353 Not available from CFSTI.

EXCITED ATOMS IN DECAYING OPTICALLY THICK PLASMAS,
Queen'S Univ Belfast (Northern Ireland) School of Physics and Applied Mathematics
For primary bibliographic entry see Field 20I.
AD-656 354 Not available from CFSTI.

INTERNATIONAL SYMPOSIUM ON FREE RADICALS (7th), PADUA, ITALY, SEPTEMBER 5-10, 1965,
Padua Univ (Italy)
P. I. Giacometti. 10 Sep 65, 60p
AFOSR-67-1796
Grant AF-EOAR-01-66

Descriptors: (*Free radicals, Symposia), Molecular orbitals, Quantum mechanics, Chemical analysis, Spectroscopy, Mass spectroscopy, Ultraviolet radiation, Photochemistry, Molecular energy levels, Italy.
Identifiers: Solvated electrons.

The document is comprised of summaries of papers presented in the following fields: quantum theory of open shell molecular states; recent advances in free radical detection in gas phase; mass spectrometry of free radicals; far ultraviolet photochemistry in free radical studies; the electron in solution; diradicals, triplets, and unstable singlet molecules.
AD-656 392 HC$3.00 MF$0.65

COMBUSTION GAS EMITTED RADIATION AND CHEMILUMINESCENCE PHENOMENA IN SOLID-GAS REACTING SYSTEMS.
Astrosystems International Inc Rockaway N J
For primary bibliographic entry see Field 21B.
AD-656 426 HC$3.00 MF$0.65

DISTRIBUTION OF ENERGY IN ELECTRICAL DISCHARGES.
Final rept. Jun 66-May 67,
Toronto Univ (Ontario) Lash Miller Chemical Labs
Jacques M. Deckers. Jul 67, 23p
AFOSR-67-1793
Grant AF-AFOSR-375-66

Descriptors: (*Gas discharges, Spectroscopy), (*Continuous spectrum, Gas discharges), (*Nitrogen, Gas discharges), (*Oxygen, Gas discharges), (*Alkanes, Gas discharges), Hydrocarbons, Oxidation, Excitation, Electrons, Energy, Band spectrum, Reaction kinetics, Canada.

Preliminary results are reported of the emission intensity of CO bands in the positive column of a DC glow discharge through fast flowing ethane oxygen mixtures. A description is given of an apparatus for measuring atomic oxygen concentration in the positive column of a discharge. A description is given of an apparatus for measuring electron energy distribution in the positive column of a slow discharge. A survey is presented of the emission of Nitrogen triplet bands in the positive column of a DC glow discharge. It is shown that population of B and C state do not increase proportionately. (Author)
AD-656 434 HC$3.00 MF$0.65

SPECIFIC VOLUMES OF WATER AT HIGH PRESSURES OBTAINED FROM ULTRASONIC-PROPAGATION MEASUREMENTS.
Technical rept.,
Harvard Univ Cambridge Mass Lyman Lab of Physics
Rajagopalan Vedam, and Gerald Holton. 31 Jul 67, 42p Rept no. TR-3, Communication-7
Contract Nonr-1866 (57)

Descriptors: (*Water, *High-pressure research), Volume, Test methods, Ultrasonic radiation, Propagation, Velocity, Thermodynamics, Thermal expansion, Computer programs.
Identifiers: Specific volume.

A computer-aided procedure was developed for obtaining specific volumes from measured ultrasonic velocities in any nondispersive medium. Newly measured velocities up to 80C and 10,000 kg/sq cm yielded values of specific volumes for water over this same range. P. W. Bridgman's measurements of specific volumes in the high-pressure range showed systematic differences of a few tenths of a percent; the present calculations yield values believed to be good to 0.050 or better. (Author)
AD-656 440 HC$3.00 MF$0.65

INVESTIGATION OF MECHANISMS FOR ELECTROCHEMICAL CATALYSIS.
Pratt and Whitney Aircraft East Hartford Conn
For primary bibliographic entry see Field 10B.
AD-656 468 HC$3.00 MF$0.65

RESEARCH ON THE ELECTROCHEMICAL OXIDATION OF HEXANE AND ITS ISOMERS.
Tyco Labs Inc Waltham Mass
For primary bibliographic entry see Field 10B.
AD-656 472 HC$3.00 MF$0.65

RESEARCH DIRECTED TOWARDS THE STUDY OF MOLECULAR BAND INTENSITIES AND DERIVED QUANTITIES.
Final rept. 15 Jan 66-14 Jan 67,
York Univ Toronto (Ontario) Centre for Research in Experimental Space Science
R. W. Nicholls. 3 May 67, 20p
AFCRL-67-0306
Contract AF 19 (628)-5813

Descriptors: (*Molecular spectroscopy, Intensity), (*Band spectrum, Intensity), Diatomic molecules, Excitation, Shock tubes, Lasers, Wave functions, Molecular association, Potential energy, Molecular orbitals, Atomic properties, Electron transitions, Canada.

The results of work in the following areas are summarized: Intensity measurement of molecular spectra; identification atlas of molecular spectra; analysis of molecular spectra; shock tube and laser excitation of powdered solids; molecular potentials and vibration and vibration-rotation wave functions; derived quantities of molecular wavefunctions; study of Honl-London factors; study of atomic and molecular structure. Publications arising from the work are listed.
AD-656 493 Not available from CFSTI.

RESEARCH ON THE ELECTROCHEMICAL OXIDATION OF HEXANE AND ITS ISOMERS.
Tyco Labs Inc Waltham Mass
For primary bibliographic entry see Field 10B.
AD-656 496 HC$3.00 MF$0.65

PULSED MAGNETIC RESONANCE STUDIES AT LOW TEMPERATURES.
Final rept.,
Washington Univ St Louis Mo Dept of Physics
R. E. Norberg, and K. Luszczynski. 30 Jun 67, 10p
AROD-2791:10-P
Grant DA-ARO (D)-31-124-G564

Descriptors: (*Helium group gases, *Nuclear magnetic resonance), (*Liquefied gases, Nuclear magnetic resonance), Helium, Neon, Krypton, Xenon, Excitation, Superfluidity, Phenons, Solidified gases.

A summary is given of work which involved the use of pulsed nuclear magnetic resonance techniques to measure the nuclear magnetic susceptibility, atomic self-diffusion, and nuclear spin relation times in liquid and gaseous He3, dilute mixtures of He3 in He4, Xe129, Xe131, Ne21, and Kr83.
AD-656 498 HC$3.00 MF$0.65

THERMAL STABILITIES OF HEXANITROAZOBENZENE (HNAB) AND HEXANITROBIPHENYL (HMB),
Naval Ordnance Lab White Oak Md
For primary bibliographic entry see Field 19A.
AD-656 572 HC$3.00 MF$0.65

DERIVATION OF THE GENERALIZED MASTER EQUATION FOR COMPOSITE PARTICLES,
Naval Radiological Defense Lab San Francisco Calif
James D. Mitchell, and William C. Schieve. 10 Jul 67, 46p Rept no. USNRDL-TR-67-78

Descriptors: (*Statistical mechanics, Equations), (*Hydrogen, Statistical mechanics), (*Irreversible processes, Equations), Gases, Particles, Diatomic molecules, Hilbert space, Selection rules, Electromagnetic fields, Kinetic theory.

Generalized master equations for composite particles are derived. The methods of Girardeau are used to construct the appropriate representation of the density matrix for particles having internal degrees of freedom. The proper exchange symmetry between particles is described as an initial condition on the von Neumann-Liouville equation. The generalized master equations are then obtained for diagonal and off-diagonal matrix elements by a generalization of the projection technique of Zwanzig. The form of the equations is shown to be exactly the same as that obtained by Prigogine for structureless particles. The (lambda sq.)t approximation is discussed and it is shown that in this limit the particles will approach an equilibrium state in which exchange between the composite particles may be ignored. (Author)
AD-656 586 HC$3.00 MF$0.65

INFLUENCE OF CHARGE COMPENSATION ON UV-EXCITATION OF RARE-EARTH FLUORESCENCE,
Harry Diamond Labs Washington D C
For primary bibliographic entry see Field 20L.
AD-656 599 HC$3.00 MF$0.65

SIZE EFFECTS IN THE TEMPERATURE VARIATION OF ELECTRICAL CONDUCTIVITY OF EPITAXIAL GOLD FILMS,
Illinois Univ Urbana Coordinated Science Lab
J. T. Jacobs. Aug 67, 100p Rept no. R-364
Contract DA-28-043-AMC-00073 (E)

Descriptors: (*Films, *Electrical conductance), Temperature, Gold, Epitaxial growth, Resistance (Electrical), Electrons, Scattering, Metals, Thickness, Electric fields, Equations, Graphics, Tables, Computer programs, Data processing systems, Mathematical analysis.

Measurements of the resistivity of evaporated epitaxial gold films were made over the temperature

range 4.2 to 300K. A computerized data analysis scheme, in which the operator played the part of a judgement element in the feedback loop, was used to fit the Fuchs-Sondheimer theory of size effects to the experimental data. The results for films thinner than 4000 A are that the degree of specularity, p, varied between 0.5 and 0.95, while the static lattice imperfection resistance, oi, varied between 5.2 and 9.0 x 10 to the minus 8th power ohm-cm. An anomalously high film resistivity in the temperature range 15 to 60K was observed. It was attributed to small angle electron-phon scattering. Date for films thicker than 4000 A could not be fit exactly to the Fuchs-Sondheimer theory below 15K and above 77K by a single set of the parameters p and o. The cause of this mismatch is unknown. Measurements on an 8.56 micron thick gold film indicate that the lattice resistivity between 8 and 20K varied as T4.4. The gold films, of thickness between 1300 A and 8.56 A, were vacuum deposited at rates in excess of 30 A/sec onto Tanganika muscovite mica held at 300C. The films were vacuum annealed before they were cooled to room temperature. They were removed from the vacuum and mounted in a liquid helium dewar. Measurements of thin film resistivity vs. temperature were automatically recorded on punched paper tape. A computer program was written to numerically calculate the Fuchs-Sondeimer integral for size effects on the electrical conductivity. A CDC 1604 computer was used to make the theoretical computations. (Author)
AD-656 609 HC$3.00 MF$0.65

RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Columbia Radiation Lab New York
For primary bibliographic entry see Field 9C.
AD-656 618 HC$3.00 MF$0.65

STEADY-STATE FIRST-ORDER REACTION AT AN INFINITE PLANE SURFACE TO WHICH REACTANT DIFFUSES FROM A POINT SOURCE.
Technical rept.,
Virginia Univ Charlottesville
J. A. Lordi, and G. H. Markstein. Jun 67, 14p
Rept no. TR-CAL-94-P
Contract Nonr-3623 (00)
Prepared in cooperation with Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
Availability: Published in International Journal of Heat and Mass Transfer nd.

Descriptors: (*Mass transfer, *Reaction kinetics), Diffusion, Integral equations, Surfaces, Concentration (Chemistry), Combustion.
Identifiers: Squid project.

The steady-state diffusion of reactant from a point source to an infinitely extended plane surface at which reactant is consumed by first-order reaction was analyzed. In dimensionless form the solution depends on a single parameter that determines the relative importance of reaction and diffusion effects on the rate. An integral expression for the reactant concentration at the surface was derived and was evaluated numerically. (Author)
AD-656 637 Not available from CFSTI.

OPTICAL POTENTIAL FOR A CHEMICALLY REACTIVE SYSTEM.
Technical rept.,
Virginia Univ Charlottesville
B. C. Eu, and John Ross. Jul 67, 18p Rept no. TR-MIT-40-P
Contract Nonr-3623 (00)
Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge and Harvard Univ., Cambridge, Mass.

Descriptors: (*Reaction kinetics, *Potential scattering), Potassium compounds, Halogenated hydrocarbons, Iodine compounds, Elastic scattering, Inelastic scattering, Chemical reactions, Potential energy, Integral equations.
Identifiers: Methyl iodide, Squid project.

The optical potential is investigated for a chemically reactive system, K + CH3I, with an assumed potential of interaction among the three species, K, I, CH3. The complex optical potential satisfies an integral equation with a kernel related to the solution of the threebody problem, as given by Faddeev. In order to obtain some information on the form of the optical potential without numerical analysis, a number of approximations are introduced. The imaginary part of the optical potential, which gives rise to absorption (reactive and inelastic collisions), is with these approximations essentially a delta function of the KI distance. The real part of the optical potential is similar in form to the repulsive potential estimated from elastic scattering experiments on this system. (Author)
AD-656 638 HC$3.00 MF$0.65

REACTION OF N2 (A (3)SIGMA-m (+)) WITH ATOMIC NITROGEN,
Stanford Research Inst Menlo Park Calif
Robert A. Young. 26 Oct 65, 8p
AROD-3493:8-P
Contract DA-31-124-ARO (D)-104
Availability: Published in Canadian Journal of Chemistry v44 p1171-4 1966.

Descriptors: (*Nitrogen, Chemical reactions), (*Molecular energy levels, Nitrogen), Excitation, Quenching (Inhibition), Reaction kinetics, Molecular association, Molecular spectroscopy.

Attempts to measure the actual lifetime of N2A (3)Sigma-m (+) in active nitrogen resulted only in a very small upper limit of approx. = 0.0005 s. This result is consistent with quenching of the A (3)Sigma-m (+) state by atomic nitrogen in an atom-atom interchange process, N + N2A (3)Sigma-m (+), v = 0) to N2X1 Sigma-g (+), v = 25) + N, having a rate coefficient of approx. > 2 X 10 to the 10th power cu cm/molecule s. It is suggested that similar processes are involved in determining the distribution of excited states observed in atom association. (Author)
AD-656 667 Not available from CFSTI.

MOLECULAR LEVEL-CROSSING SPECTROSCOPY: THE g VALUE FOR AN EXCITED STATE OF NITRIC OXIDE,
Joint Inst for Lab Astrophysics Boulder Colo
David R. Crosley, and Richard N. Zare. 20 Apr 67, 6p
AROD-4445:85-P
Contract DA-31-124-ARO (D)-139, ARPA Order-492
Availability: Published in Physical Review Letters v18 n22 p942-4 May 29 1967.

Descriptors: (*Molecular spectroscopy, Nitrogen oxides), (*Nitrogen oxides, Molecular energy levels), Excitation, Fluorescence, Magnetic fields, Electron transitions, Relaxation time.

Zero-field level-crossing effects have been optically detected in the nitric oxide molecule by observing the change in intensity of molecular fluorescence from a specified state with magnetic field. The intensity follows an inverted Lorentzian with a field strength at half-maximum of 0.379 plus or minus 0.030 G. Together with the radiative lifetime as recently determined by Jeunehomme, this gives for the molecular g factor for this level a value of 0.762 plus or minus 0.060. This places an upper limit on the magnitude of gamma, the molecular rho-type doubling constant, of the absolute value of gamma < or = 0.000013/cm (390 KHz). (Author)
AD-656 669 Not available from CFSTI.

AN ELECTROKINETIC STUDY OF THE PLATINUM-POTASSIUM IODIDE SOLUTION INTERFACE,
Texas Univ Austin Defense Research Lab
Jerre T. Anderson. 1 May 67, 118p Rept no. DRL-A-280
Contract Nonr-3579 (02)

Descriptors: (*Electrochemistry, Interfaces), (*Platinum, Electrochemistry), (*Potassium compounds, Electrochemistry), (*Electrical double layer, Reaction kinetics), Electrodes, Electrolytes, Iodides, Electroosmosis, Voltage, Dipole moments.

The linear phenomenological laws as applied to electrokinetic effects are used to (1) show that problems arising from surface conductance may be avoided; (2) show that ac bridge measurements of the conductance of an electrokinetic system may lead to incorrect results; (3) develop characteristic curves for electrokinetic energy converters. It is shown that one of the linear equations is valid for the platinum-potassium iodide system. A general equation for the zeta potential-streaming current relation valid for porous media is developed. Evidence is adduced for the assignment of a Freundlich isotherm to the Gouy-Chapman surface charge at the platinum-potassium iodide solution interface whereas previous work indicates that the adsorption of iodide follows a Temkin isotherm. For a particular model the surface charge is related to surface dipole moment. A method of determining the isotherm for zeta potential determining species is proposed. (Author)
AD-656 726 HC$3.00 MF$0.65

RESEARCH IN ATOMIC AND MOLECULAR PROPERTIES BY THE MOLECULAR BEAM METHOD.
Final rept. 1 Jan 57-30 Jun 66,
Columbia Radiation Lab New York
P. Kusch. Aug 67, 10p
Contract Nonr-266 (45)

Descriptors: (*Molecular beams, Scientific research), (*Molecular energy levels, Hyperfine structure), (*Atomic energy levels, Hyperfine structure), Indium, Oxygen, Line spectrum, Excitation, Pumping (Optical), Electron transitions.

The results of a program of research in atomic and molecular physics by the molecular-beam method are briefly summarized. Work was done on the study of hyperfine structure in several metastable atomic states, on a critical study of the hyperfine structure of indium, and on the hyperfine structure of a short-lived isotope of oxygen. The process of the production of metastable hydrogen atoms was investigated. Several investigations of hyperfine structures of atoms by optical-pumping and level-crossing techniques are reported. Publications resulting from the work are listed.
AD-656 734 HC$3.00 MF$0.65

NONEQUILIBRIUM RADIATION AND IONIZATION IN SHOCK WAVES,
Purdue Univ Lafayette Ind School of Aeronautics Astronautics and Engineering Sciences
For primary bibliographic entry see Field 20D.
AD-656 767 HC$3.00 MF$0.65

A STUDY OF LINE SHAPE FOR CO INFRARED EMISSION LINES.
Catholic Univ of America Washington D C Dept of Physics
For primary bibliographic entry see Field 21B.
AD-656 779 HC$3.00 MF$0.65

APPLICATION OF COMPUTER FACILITIES FOR THE DETERMINATION OF SIZE DISTRIBUTION IN POLYMER LATICES.
Wayne State Univ., Detroit, Mich. Dept. of Chemistry.
For primary bibliographic entry see Field 9B.
AD-807 464 HC$3.00 MF$0.65

Group 7D—Physical chemistry

CHEMICAL ENGINEERING DIVISION SEMI-ANNUAL REPORT, JANUARY-JUNE 1966.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 15.
ANL-7225 HC$3.00 MF$0.65

GEL-ADDITION PROCESS CHEMICAL STUDIES. QUARTERLY PROGRESS REPORT NO. 2, OCTOBER-DECEMBER 1966.
Babcock and Wilcox Co., Lynchburg, Va. Atomic Energy Div.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 15.
BAW-3714-2 HC$3.00 MF$0.65

EXPERIMENTAL STUDY OF SCATTERING IN ATOM- SURFACE COLLISIONS WITH ATOM ENERGIES OF THE ORDER OF E V.
California Univ., Los Angeles. Dept. of Engineering.
For primary bibliographic entry see Field 20H.
For abstract, see STAR 05 18.
N67-31556 HC$3.00 MF$0.65

STRUCTURE ANALYSIS ON STEREOREGULAR POLYMETHYLMETHACRYLATE IN SOLUTIONS.
Conformatieonderzoek Aan Stereoregulair Polymethylmethacrylaat in Oplossingen
Technische Hogeschool, Eindhoven (Netherlands).
W. B. Van Den Berg. 1967, 125p
in Dutch, English Summary

Descriptors: *Molecular structure, *Polymethyl methacrylate, *Stereochemistry, *Vinyl polymer, Analysis, Characterization, Chemistry, Isomer, Methacrylate, Molecular, Polymer, Polymethyl, Solution, Structure, Vinyl, Viscosity.

For abstract, see STAR 05 18.
N67-31659 HC$3.00 MF$0.65

ELECTROCHEMICAL STUDIES OF PLATINUM SURFACE OXIDATION IN RELATION TO HYDROCARBON OXIDATION. PART IV - STUDIES WITH C14- LABELLED COMPOUNDS IN RELATION TO CO2 FORMATION AND SURFACE OXIDATION OF PT INTERIM REPORT, JUN. 1964 - OCT. 1966.
Canadian Commercial Corp., Ottawa (Ontario).
D. Gilroy, L. Marincic, E. J. Rudd, and J. Wojtowicz. Oct 66, 36p AD-652680

Descriptors: *Carbon 14, *Electrochemical oxidation, *Surface chemistry, Acid, Carbon dioxide, Cell, Chemisorption, Chemistry, Compound, Electrochemistry, Formate, Formation, Formic, Fuel, Hydrocarbon, Labelling, Oxidation, Platinum, Surface, Tracer.

For abstract, see STAR 05 18.
N67-31980 HC$3.00 MF$0.65

EVOLUTION OF CHLORIN AT GRAPHITE ELECTRODES.
Vorming Van Chloor Aan Elektroden Van Grafiet
Technische Hogeschool, Eindhoven (Netherlands).
L. J. Janssen. 1967, 179p
in Dutch, English Summary

Descriptors: *Chlorine oxide, *Electrode film barrier, *Graphite, *Sodium chloride, Anode, Barrier, Chloride, Chlorine, Current, Density, Electrode, Electrolysis, Evolution, Film, Oxide, Polarization, Sodium, Structure, Surface.

For abstract, see STAR 05 18.
N67-32120 HC$3.00 MF$0.65

ELECTROCHEMICAL STUDY OF ANODIC OXIDE LAYERS OF TANTALUM.
Eidgenossische Technische Hochschule, Zurich (Switzerland).
A. Tvarusko. 1966, 97p DISS-3879
Supported in Part By Ciba, Ltd., Basel

Descriptors: *Anode, *Electrochemistry, *Tantalum oxide, Capacitor, Constant, Electrolyte, Formation, Layer, Low current, Oxide, Tantalum, Thin, Voltage.

For abstract, see STAR 05 18.
N67-32267 HC$3.00 MF$0.65

THE CRYSTAL STRUCTURE OF DIPOTASSIUM TETRANITROETHIDE.
Rice Univ., Houston, Tex. Dept. of Chemistry.
M. Dyke, and R. L. Sass. 1967, 10p NASA-CR-86980
Grant NSG-6

Descriptors: *Crystal structure, *Potassium compound, *Single crystal, *X-ray diffraction, Atom, Axis, Bond, Carbon, Compound, Crystal, Diffraction, Molecule, Nitrogen, Potassium, Single, Structure, Thermal, Vibration, X-ray.

For abstract, see STAR 05 18.
N67-32278 HC$3.00 MF$0.65

EXPLORATORY STUDIES OF CONTACT ANGLE HYSTERESIS, WETTING OF SOLIDIFIED RARE GASES AND SURFACE PROPERTIES OF MERCURY FINAL REPORT.
Gillette Research Inst., Inc., Washington, D. C.
A. H. Ellison, J. D. Galligan, C. A. Rader, and A. M. Schwartz. 19 May 67, 54p NASA-CR-72269
Contract NAS3-8909

Descriptors: *Hysteresis, *Mercury (metal), *Rare gas, *Surface chemistry, *Wetting, Angle, Chemistry, Contact, Film, Impurity, Property, Solid, Surface.

For abstract, see STAR 05 18.
N67-32280 HC$3.00 MF$0.65

COMPATIBILITY OF PYROLYTIC-CARBON COATED FUEL PARTICLES WITH WATER VAPOR,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 15.
ORNL-4014 HC$3.00 MF$0.65

AN EQUATION OF STATE FOR FLUID PARAHYDROGEN FROM THE TRIPLE-POINT TO 100K AT PRESSURES TO 350 ATMOSPHERES,
National Bureau of Standards, Boulder, Colo. Inst. for Materials Research.
For primary bibliographic entry see Field 20M.
PB-175 623 HC$3.00 MF$0.65

MEASUREMENT OF ATMOSPHERIC AEROSOLS BY POLARIZED-LASER LIGHT SCATTERING.
Utah Univ., Salt Lake City. Microwave Device and Physical Electronics Lab.
For primary bibliographic entry see Field 20E.
PB-175 688 HC$3.00 MF$0.65

THE CONDENSATION OF STEAM AT LOW PRESSURES.
Technical rept.,
California Univ., Berkeley. Space Sciences Lab.
A. F. Mills. 23 Nov 65, 169p Series-6-Issue-39
Grant NSF-GP-2520

Descriptors: (*Condensation, Steam), (*Heat transfer, Low-pressure research), Alcohols, Gases, Kinetic theory, Temperature, Vacuum, Surface properties, Contamination, Butanols, Liquids, Evaporation, Water vapor, Tables.

An experimental investigation was undertaken to study the film condensation of water on a vertical flat plate under vacuum conditions. The interfacial resistance to heat transfer was measured and the result used to deduce the value of the condensation coefficient, f, of water. No significant interfacial resistance was observed and thus a value of f close to unity is indicated. Previous experimental results and theoretical analyses leading to a value of f approximately 0.036 for water were examined and good reasons found for rejecting their conclusions. Thus since there is little reason to believe otherwise, the value of f for water should be taken to unity. (Author)
PB-175 703 HC$3.00 MF$0.65

7E. Radio and Radiation Chemistry

THEORETICAL STUDIES OF COMPLEXED TRANSITION METAL PHOTOTROPIC SYSTEMS.
Final rept. 1 Apr 64-31 Mar 65,
Nuclear Research Associates, Inc., Long Island City, N. Y.
Jerome Goodman, Sarah Mook, and Joseph Steigman. 18 Jun 65, 57p NRA-841
Contract NOw-64-0380

Descriptors: (*Photochromism, Complex compounds), (*Photochemistry, Complex compounds), (*Films, Photochemistry), Solvates, Phosphoric acids, Copper compounds, Bromides, Polymers, Vinyl plastics, Polyester plastics, Organic solvents, Absorption spectrum, Spectra (Visible + ultraviolet), Spectra (Infrared), Reaction kinetics, Chemical equilibrium, Transition elements, Halides, Optical materials, Flashblindness, Optical properties, Thermal properties, X-ray diffraction analysis, Nuclear magnetic resonance.
Identifiers: Phototropic materials.

The purpose of this research was to study the mechanism of the light- or heat-induced darkening of polymer films containing high concentrations of Cu Br 2. The studies, mainly spectrophotometric, indicated that the darkening reaction is basically thermotropic, with the reaction in polymer films being essentially the same as in analogous solutions and depending on trapped solvent in the films. The important reactions are related to the equilibria between different Cu Br 2 complexes, with temperature change causing the large absorbance increase. Interactions between the Cu ions and color-intensifying organic functional groups on the resin appear to be solvation interactions rather than complex formation, so that by supplying these functional groups in the form of solvent, the system can be made relatively independent of resin type. At least part of the effect of H3 PO4 appears to be a general acidity effect.
AD-470 074 HC$3.00 MF$0.65

STUDIES ON THE QUANTUM YIELDS OF THE PHOTODISSOCIATION OF CARBON MONOXIDE FROM HEMOGLOBIN AND MYOGLOBIN,
Rome Univ (Italy) Istituto Di Chimica Biologica
For primary bibliographic entry see Field 6A.
AD-655 885 Not available from CFSTI.

SMOLUCHOWSKI EQUATION FOR SYSTEMS WHICH DO NOT OBEY THE STOKES-EINSTEIN RELATION.
Aerospace Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 7D.
AD-656 156 Not available from CFSTI.

THE DEPENDENCE OF PHOTOLYTIC DEGRADATION OF POLYETHYLENE ON DEGREE OF DISPERSION OF CARBON BLACK,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 11I.
AD-656 236 HC$3.00 MF$0.65

EXPERIMENTAL STUDY OF CHEMI-IONIZATION.
Louvain Univ (Belgium) Lab of Inorganic Chemistry
For primary bibliographic entry see Field 7D.
AD-656 343 HC$3.00 MF$0.65

THE PHOTOCHEMISTRY OF BORAZINE. PREPARATION OF B-MONOHYDROXYBORAZINE, DIBORAZINYL ETHER AND B-MONOAMINOBORAZINE,
Cornell Univ Ithaca N Y Dept of Chemistry
George H. Lee, II, and Richard F. Porter. 19 Nov 66, 8p
AROD-4890:15-C
Contract DA-31-124-ARO (D)-320
Research supported in part by ARPA.
Availability: Published in Inorganic Chemistry v6 n4 p648-52 Apr 1967.

Descriptors: (*Boron compounds, *Photochemistry), (*N-heterocyclic compounds, Photochemistry), Oxygen, Water vapor, Ultraviolet radiation, Alcohols, Ethers, Amines, Photochemistry, Ammonia, Azines, Mass spectrum, Spectra (Infrared).
Identifiers: Amino borazines, B-heterocyclic compounds, Borazines, Diborazinyl ethers, Hydroxy borazines.

Products of the photochemical reactions of low-pressure mixtures of borazine and oxygen and borazine and water vapor were identified by mass and infrared spectra as B3N3H5OH (B-monohydroxyborazine) and (B3N3H5)2O (diborazinyl ether). The ether derivative is the more stable compound and can be isolated in small quantities. The product of the photochemical reaction of borazine with ammonia is identified as B3N3H5NH2 (B-monoaminoborazine). (Author)
AD-656 645 Not available from CFSTI.

IRRADIATION 'FACTOR-DEPENDENCY'. STYRENE WITH ADDITIVES.
Radiation Chemistry Lab. Series research rept., Quartermaster Research and Engineering Command Natick Mass
Ed. F. Degering, G. J. Caldarella, Flora E. Evans, Stephen Grib, and Throop Smith. Nov 60, 32p
Rept no. RR-3
See also PB-145 895.

Descriptors: (*Styrene plastics, *Radiation chemistry), Styrenes, Polymerization, Additives, Silicones, Fatty acids, Fatty acid esters, Acrylic resins, Vinyl plastics, Acetates, Acrylonitrile polymers, Electron bombardment, Dose rate, Moisture.
Identifiers: Acrylic acids, Butyl acrylates, Methacrylic acids, Methyl acrylates, Vinyl acetates.

Studies involving the irradiation of styrene (containing 1% silicone oil, acrylic acid, methacrylic acid, methyl acrylate, butyl acrylate, vinyl acetate, or acrylonitrile) with a 2 Mev electron beam under various exposure conditions yielded the following conclusions: (1) the effect of an additive is a function of dose rate with respect to both relative yield and the molecular weight of the polymer, (2) the molecular weight decreases in general with an increase in dose rate, irrespective of the additive, (3) an additive which significantly increases the yield tends in general to produce somewhat lower molecular weight polymers than do other additives which give lower yields, (4) an additive, as a function of dose rate, may either increase or decrease the yield of polymer obtained by the irradiation-induced polymerization of some vinyl monomers, and (5) the efficiency of the polymerization decreases markedly for the higher dose rates used in this study. (Author)
AD-656 760 HC$3.00 MF$0.65

RADIOLOGICAL PHYSICS DIVISION ANNUAL REPORT, JULY 1965 TO JUNE 1966,
Argonne National Lab., Ill.
Robert A. Conard, and Leo M. Meyer. 1966, 124p
Contract W-31-109-eng-38

Descriptors: (*Radiobiology, Reports), (*Radiological contamination, *Charged particles), Radiological dosage, Dose rate, Medical research.

For abstract, see NSA 21 15.
ANL-7220 HC$3.00 MF$0.65

ISOSHLD-II CODE REVISION TO INCLUDE CALCULATION OF DOSE RATE FROM SHIELDED BREMSSTRAHLUNG SOURCES,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
G. L. Simmons, J. J. Regimbal, and J. Greenborg. Mar 67, 41p
Contract AT (45-1)-1830

Descriptors: (*Radiological dosage, *Dose rate), (*Radiation chemistry, *Programming (Computers)), Shielding, Bremsstrahlung, Sources.

For abstract, see NSA 21 15.
BNWL-236-Suppl-1 HC$3.00 MF$0.65

THE CHEMISTRY AND LUMINESCENCE OF ANTIMONY- CONTAINING CALCIUM CHLORAPATITE.
Technische Hogeschool, Eindhoven (Netherlands).
For primary bibliographic entry see Field 7B.
For abstract, see STAR 05 18.
N67-32266 HC$3.00 MF$0.65

STUDIES IN COMETARY ASTROPHYSICS FINAL REPORT, 19 MAY 1965 - 18 MAY 1967.
Melpar, Inc., Falls Church, Va.
For primary bibliographic entry see Field 3B.
For abstract, see STAR 05 18.
N67-32289 HC$3.00 MF$0.65

X-RAY AND ELECTRON DAMAGE, AND PHOTOCHEMICAL REACTIONS IN CD S SINGLE CRYSTALS AND LAYERS, AND ANNEALING OF THESE DEFECTS FINAL REPORT.
Delaware Univ., Newark. Dept. of Physics.
For primary bibliographic entry see Field 20L.
For abstract, see STAR 05 18.
N67-32395 HC$3.00 MF$0.65

8. EARTH SCIENCES AND OCEANOGRAPHY

8A. Biological Oceanography

BIBLIOGRAPHY OF REPORTS, 1962.
Woods Hole Oceanographic Institution, Mass.
Dec 62, 14p WHOI-Ref-62-43

Descriptors: (*Oceanology, Reports), Underwater sound, Ocean currents, Marine meteorology, Aquatic animals, Plankton, Tides, Wind, Bathythermograph data, Puerto Rico, Caribbean Sea, Baltic Sea, Mediterranean Sea, Atlantic Ocean.

Contents: Investigations of climate and oceanographic factors influencing the environment of fish; Marine Meteorology; Some direct measurements of the non-tidal drift on the continental shelf between Cape Cod and Cape Hatteras; Biological, chemical and radiochemical studies of marine plankton; Instruction manual for recording current meter; Chain number 11 Atlantic Ocean and Caribbean Sea; Chain number 13 Atlantic Ocean, North Sea and Baltic Sea; Chain number 17 Atlantic Ocean, Romanche Trench and mid-Atlantic Ridge survey; Chain number 19 Atlantic Ocean, Puerto Rico Trench, North Wall and Outer Ridge; Track charts, bathymetry and location of observations. Chain cruise 21, Atlantic Ocean and Mediterranean Sea. (Author)
AD-416 398 HC$3.00

THE INFLUENCE OF NATURAL LIGHT ON THE VERTICAL MIGRATIONS OF AN ANIMAL COMMUNITY IN THE SEA,
Scripps Institution of Oceanography La Jolla Calif
Brian P. Boden, and Elizabeth M. Kampa. 1967, 14p
Contract Nonr-2216 (21), Grant NSF-GB-1152
Availability: Published in Symposia of the Zoological Society of London n19 p15-26 1967.

Descriptors: (*Photosensitivity (Biological), Aquatic animals), Scattering, Underwater sound, Plankton, Diurnal variations, Light, Echo ranging, Ecology, Marine biology.

Observations of the descent and ascent of a constant level of light in the sea during two successive dawns and two successive dusks are compared with simultaneous observations of the descents and ascents of a community of animals, detected by an echo sounder. The results lead to the conclusion that the diurnal vertical migrations of the animals comprising this sonic-scattering layer are controlled primarily by changes in the photoenvironment. Incoming radiation at the sea surface was monitored throughout the experiments, and the merit of such monitoring is discussed. (Author)
AD-656 004 Not available from CFSTI.

MARINE BORER AND FOULING STUDIES.
Final rept. 1 Apr 57-14 Jun 67.
Clapp (William F) Labs Inc Duxbury Mass
14 Jun 67, 57p Rept no. 13759
Contract Nonr-2318 (00)
See also AD-630 696.

Descriptors: (*Marine borers, Distribution), Fouling, Morphology (Biology), Degradation, Marine biology, Microorganisms, Control, Electric cables, Hydrofoils.
Identifiers: Teredinidae.

Fundamental data concerning the occurrence and distribution of marine borers and fouling organisms at twenty five world wide locations has been assembled. Information obtained, though insufficient to establish conclusively seasonal and biogeographic trends for given species, is invaluable as a starting point for additional, more frequent panel exposures in selected foreign and domestic localities in order to more clearly define the salient parameters of borer and fouling problems. Adequate data were obtained to identify twenty two species of marine borers, the various kinds of macro-fouling present, and to demonstrate the value of considering establishing a more closely defined exposure program at foreign locations. Sufficient undamaged specimens of marine borers were removed from the wood test panels for the taxonomic studies carried out by Dr. Ruth Turner, Harvard University, Cambridge, Massachusetts. Results of her studies were published in 1966 as the monograph, A Survey and Illustrated Catalogue of the Teredinidae (Mollusca: Bivalvia) AD-630 696. Studies to explore the thermal effects on control of fouling were conducted and soon discontinued in 1960 due to defective material. Twelve electrical conductor cables were simultaneously exposed to both water and mud at three locations: Daytona Beach, Florida; Duxbury, Massachusetts; and Wrightsville Beach, North Carolina for four to nineteen weeks. Macro-fouling was present in the water exposure area but no damage to the cables was observed. Microbial colonization was appar-

ent on six of the twelve cable samples subjected to the mud exposure. (Author)
AD-656 090 HC$3.00 MF$0.65

ISRAEL SOUTH RED SEA EXPEDITION REPORTS, BULLETIN NO. 43, 1962.
Tel-Aviv Univ (Israel) Dept of Zoology
Mar 67, 71p
Contracts N62558-2985, N62558-3335
Availability: Published in Israel South Red Sea Expedition n22-26 p3-68 1967.

Descriptors: (*Marine biology, *Red Sea), Ecology, Plants (Botany), Trees, Seacoast, Arthropods, Morphology (Biology), Distribution, Ethiopia.

During a study of the marine fauna of the Dahlak Archipelago, especially that of Entedebir Island, an effort was made to collect some of the terrestrial fauna and flora. Since the work of the Israel South Red Sea Expedition, 1962 (March 10th-April 8th), commenced immediately after the spring rains, Entedebir was covered with plants of various ecotypic elements. The majority of trees consisted of Acacia sp., Salvadora persica L., and many young baobabs (Adansonia digitata L.) as well as large candelabra forms of a Euphorbia species. There were numerous Zygophyllum (Z. coccineum L. and Z. simplex L.), and on the bare rocks along the seashore a dense vegetation of Sueda monoica FORSK. In valleys and rock crevices in which sand and soil had accumulated, grew many Gramineae (Eromopogon foveolatus STAPF., Cenchus pennisetiformis HOCHST. et STAPF., Aeluropus brevifolius KOLN.) and Cyperus effusus ROTTB. (Cyperaceae). There was a dense population of various arthropods, mainly insects among the vegetation. The most prominent group were the Acridoidea, both phytophilic and geophilic species. Seventeen species of grasshoppers were collected: Two of the family PYRGOMORPHIDAE and 15 of the family ACRIDIDAE (taxonomy according to DIRSH, 1961). Two of the species, Sphingonotus femoralis Uv. and Acrotylus longipes meruensis SJOST., have so far not been reported from Ethiopia. (Author)
AD-656 727 Not available from CFSTI.

ISRAEL SOUTH RED SEA EXPEDITION REPORTS, BULLETIN NO. 46, 1962.
Tel-Aviv Univ (Israel) Dept of Zoology
May 67, 129p
Contracts N62558-2985, N62558-3335
Availability: Published in Israel South Red Sea Expedition n27 p3-126 1967.

Descriptors: (*Marine biology, *Red Sea), Ecology, Aquatic animals, Morphology (Biology), Crustacea.

Methodical search for associated Copepoda during the Israel South Red Sea Expedition 1962 to the Eritrean coasts (Ethiopia) revealed the presence of an unexpectedly great number and variety of Notodelphyidae, a copepod family usually associated with Tunicata. This makes a total of 28 Red Sea species, in 14 genera. In addition to the new species listed above, new names are suggested in the present paper for one species of Periproctia, and two of Bonnierilla. The Bonnierilla group, a group of closely related genera within the family, is revised, and a key to the units is given. The 3 new genera described, all belong to this group. (Author)
AD-656 728 Not available from CFSTI.

8C. Dynamic Oceanography

BIBLIOGRAPHY OF REPORTS, 1962.
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 8A.
AD-416 398 HC$3.00

ON THE DETERMINATION OF THE THICKNESS OF THE BAROCLINIC LAYER OF THE SEA,
Rand Corp Santa Monica Calif
P. S. Lineikin. Aug 67, 9p Rept no. P-3644
TT-67-62549
Trans. of Akademiya Nauk SSSR. Doklady, v101 n3 p461-4 1955.

Descriptors: (*Hydrodynamics, Ocean currents), Thickness, Perturbation theory, Wind, Stresses, Equilibrium, Velocity, Mathematical analysis, Density, Fluid flow, Inland waterways.

The author considers the equilibrium distribution of velocity, pressure, density and sea-surface elevation in a canal subject to a zonal wind stress. A principle result is that the diffusion of density approximately balances advective effects when the linearized perturbations are assumed to have an exponential decay with depth. The resulting characteristic thickness of the baroclinic layer is some 22 times the Ekman frictional depth. (Author)
AD-656 698 HC$3.00 MF$0.65

THE LIMITING HEIGHT OF OCEAN WAVES,
Massachusetts Inst. of Tech., Cambridge. Dept. of Naval Architecture and Marine Engineering.
For primary bibliographic entry see Field 13J.
PB-175 655 HC$3.00 MF$0.65

8D. Geochemistry

SPOT TEST DETECTION OF SULFIDE IN MINERALS,
Aerospace Research Labs Wright-Patterson AFB Ohio
Frank L. Chan. 8 Aug 66, 7p Rept no. ARL-67-0096
Availability: Published in Analytica Chimica Acta v37 p391-3 1967.

Descriptors: (*Minerals, Chemical analysis), (*Sulfides, Chemical analysis), Test methods, Acceptability, Chemical indicators, Semiconductors.

A study is described which was designed to give comparative data on some old and new tests for the detection of sulfides in minerals in order to find out if there are any differences in the behavior of different sulfide minerals.
AD-656 184 Not available from CFSTI.

PORPHYRINS OF HIGH MOLECULAR WEIGHT IN A TRIASSIC OIL SHALE: EVIDENCE BY GEL PERMEATION CHROMATOGRAPHY.
Woods Hole Oceanographic Institution Mass
For primary bibliographic entry see Field 8G.
AD-656 223 Not available from CFSTI.

SEARCH FOR BIOLOGICAL PRECURSOR MOLECULES IN VOLCANIC VOLATILE SYSTEMS SEMIANNUAL STATUS REPORT, SEP. 1966 - MAR. 1967.
Hawaii Univ., Honolulu. Geochemistry Div.
For primary bibliographic entry see Field 6C.
For abstract, see STAR 05 18.
N67-31642 HC$3.00 MF$0.65

8E. Geodesy

GEOPS.
Research note,
Army Engineer Geodesy Intelligence and Mapping Research and Development Agency Fort Belvoir Va
Armando Mancini. Mar 67, 54p Rept no. GIMRADA-RN-25

Descriptors: (*Computer programs, *Geodesics), (*Orbital trajectories, Satellites (Artificial)), Least squares method, Gravity, Mathematical models, Perturbation theory.
Identifiers: GEOPS, Geopotential.

A method and a computer program is described which performs the recovery of gravitational coefficients and station coordinates through the technique of sequential estimation as opposed to the batch least squares process. It is believed that this is the first attempt of determining geodetic parameters from perturbations of earth satellites through a Kalman-type recursive technique. (Author)
AD-655 852 HC$3.00 MF$0.65

ELECTRONIC POSITIONING SYSTEMS FOR SURVEYORS.
Technical memo.,
Coast and Geodetic Survey, Rockville, Md. Engineering Div.
Angelo A. Ferrara. May 67, 108p C/GSTM-3

Descriptors: (*Surveying, Electronic equipment), (*Navigation, Electronic equipment), Navigation satellites, Position finding, Reviews, Geodesics, Tracking.

This Memorandum describes and summarizes the characteristics of various electronic positioning systems that are of interest to the surveyor.
PB-175 604 HC$3.00 MF$0.65

8F. Geography

CANADIAN OPERATION 'HAZEN-TANQUARY', 1965 AND 1966,
Defence Research Board Ottawa (Ontario)
G. Hattersley-Smith, and D. R. Oliver. 1967, 4p
Availability: Published in Unidentified journal p607-10.

Descriptors: (*Arctic regions, Scientific research), Weather stations, Meteorological parameters, Ellesmere Island, Lakes, Radiochemistry, Glaciers, Sea ice, Insects, Birds, Climatology, Canada.
Identifiers: Hazen-Tanquary.

The Defence Research Board, in conjunction with the Entomology Research Institute, continued to maintain Tanquary and Hazen camps as scientific field stations. A total of twenty-two scientists and assistants in 1965, and twenty-five in 1966, were in the field for periods varying from two weeks to five months between late April and late August in 1965, and between early April and early September in 1966. Field work is reported in areas of meteorlogy, oceanography, radiochemistry glaciology, and biology.
AD-656 133 Not available from CFSTI.

A SUBMERGED HOLOCENE SHORELINE NEAR BLOCK ISLAND, RHODE ISLAND,
Rhode Island Univ Kingston Narragansett Marine Lab
R. L. McMaster, and Louis E. Garrison. 29 Jul 66, 9p Rept no. TR-8, Ref-67-6
Contract Nonr-396 (08)
Availability: Published in The Journal of Geology, v75 n3, May 1967.

Descriptors: (*Geology, *Rhode Island), (*Islands, Rhode Island), Sedimentation, Bathythermograph data, Stratigraphy, Underwater photography, Terrain.

A drowned barrier spit-lagoon-headland complex has been located south of Block Island, Rhode Island, at a depth of about 80 feet. The morphology of these submerged shore-line features is similar to that of features occurring on the Rhode Island coast at present. If isostatic adjustments have been insignificant in this area, the drowned features

were related to a sea level still stand at an estimated 80 feet (24 m.) below present sea level. A changing pattern of sediment types and structures across this shore line was observed from a submarine. (Author)
AD-656 143 Not available from CFSTI.

TEMPORAL PRECISION IN BEACH PROFILING.
Technical rept.,
Louisiana State Univ Baton Rouge Coastal Studies Inst
John C. Ferm, and Robert Dolan. 1967, 4p Rept no. TR-41
Contract Nonr-1575 (03)
Prepared in cooperation with Virginia Univ., Charlottesville.
Availability: Published in The Professional Geographer v19 n1 p12-4 Jan 1967.

Descriptors: (*Beaches, *North Carolina), Measurement, Tides, Sand, Periodic variations, Ocean waves, Graphics.

Beach profiles are the most common expression of beach morphology, and the precision with which they represent actual configuration is determined by the number of elevation points along the profile. Although profiles are usually measured during an hour or less, it is often inferred that they apply over a much longer time period. The purpose of this paper is to demonstrate the degree to which a single measured profile represents the actual beach profile over a specific span of time. Along the Outer Banks of North Carolina, a series of profiles from the backshore dunes to 770 feet offshore was measured from February to April, 1964. The design included observations within 12-hour tidal cycles, comparisons among tidal cycles, and comparisons between periods of differing wave conditions. These data provided a basis for evaluation of the relationship between profile variation and inshore processes, as well as a basis for estimating the precision of beach profiles in general. (Author)
AD-656 145 Not available from CFSTI.

MICROTOPOGRAPHY OF THE BLAKE-BAHAMA REGION.
Lamont Geological Observatory Palisades N Y
For primary bibliographic entry see Field 8J.
AD-656 719 HC$3.00 MF$0.65

SOVIET ANTARCTIC EXPEDITIONS, 1959 - 1961.
Israel Program for Scientific Translations, Ltd., Jerusalem.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 05 18.
N67-32168 HC$3.00 MF$0.65

SOVIET ANTARCTIC EXPEDITIONS, 1955 - 1959.
Israel Program for Scientific Translations, Ltd., Jerusalem.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 05 18.
N67-32170 HC$3.00 MF$0.65

8G. Geology and Mineralogy

POTENTIAL APPLICATIONS OF MAGNETIC GRADIENTS TO MARINE GEOPHYSICS.
Master's thesis,
Massachusetts Inst of Tech Cambridge Dept of Geology and Geophysics
William E. Byrd, Jr. Jun 67, 134p
Contract Nonr-1841 (74)

Descriptors: (*Marine geophysics, Theses), (*Structural geology, Magnetic fields), Magnetic anomaly detection, Earth (Planet), Terrain, Models (Simulations), Anomalies, Attenuation, Zeeman effect, Ocean bottom, Triangulation, Sensors, Periodic variations, Magnetic storms.

Chapter I is a consideration of the application of magnetic gradients to marine geophysics and it shows that gradients are well-suited to the investigation of sea floor structure. Gradients may be utilized in the following areas of study: investigation of magnetic anomaly fine structure; delineation of geologic contact position and orientation; estimation of depth to source and source type; and determination of magnetization direction from topographic effects. This chapter also discusses the requirements for a marine magnetic gradiometer and proposes a system utilizing two Zeeman effect sensors in a stable vertical towed array. It also includes investigation of error sources and means for their correction or reduction. Chapter II reviews present knowledge and theory of ocean ridge structure, with emphasis on the characteristic magnetic anomalies observed over the ridges. We propose that these anomalies arise from a subhorizontal layered structure composed of basaltic flows which have originated in the ridge's axial region. Included in this presentation is a sub-horizontal layered model of the Reykjanes Ridge. Computed magnetic anomaly profiles over this model correlate well with observed profiles taken from a survey by Heirtzler.
AD-655 892 HC$3.00 MF$0.65

ON TECTONIC TERMINOLOGY,
Directorate of Scientific Information Services Ottawa (Ontario)
L. M. Parfenov, V. A. Solovev, and A. M. Borovikov. May 67, 13p Rept no. DSIS-T-475-R
TT-67-62400
Trans. of Geologiya i Geofizika (USSR) n9 p118-23 1961.

Descriptors: (*Geology, *Vocabulary), (*English language, *Russian language), Terrain, Maps, Structural geology, Textbooks, Folds (Geology), Faults (Geology), Linguistics.

In the first stage of this work it is essential to collect terms and systematize them. The second stage of the work must involve a comprehensive analysis of the systematized terms according to the following criteria: (1) the question of priority; (2) justification for making a distinction; (3) correctness of constructing the word; (4) history of the development of the concepts inherent in the terms; (5) perception of inadequacies and contradictions in the use of terms (indefiniteness, multiplicity of meanings, multiplicity of terms, mixing of different systems of terms, mixing with non-tectonic concepts, errors of translation, and so forth). As an example of such an analysis one may cite the discussion of the terms 'clastic dyke', 'facies' and terms defining rock bedding in the Tectonic Colloquium held at the Institute of Geology and Geophysics.
AD-655 900 HC$3.00 MF$0.65

A SUBMERGED HOLOCENE SHORELINE NEAR BLOCK ISLAND, RHODE ISLAND,
Rhode Island Univ Kingston Narragansett Marine Lab
For primary bibliographic entry see Field 8F.
AD-656 143 Not available from CFSTI.

SPOT TEST DETECTION OF SULFIDE IN MINERALS,
Aerospace Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 8D.
AD-656 184 Not available from CFSTI.

SOME RECENT STUDIES OF ELECTRICAL GRADE FILLERS IN BUTYL RUBBER AND OTHER INSULATION MATERIALS,
Enjay Labs Linden N J
For primary bibliographic entry see Field 11J.
AD-656 191 HC$3.00 MF$0.65

CONSTRUCTION DETAILS AND PROCESSING METHODS OF GEOPHYSICAL CABLES,
Vector Cable Co Houston Tex
For primary bibliographic entry see Field 9A.
AD-656 194 HC$3.00 MF$0.65

PORPHYRINS OF HIGH MOLECULAR WEIGHT IN A TRIASSIC OIL SHALE: EVIDENCE BY GEL PERMEATION CHROMATOGRAPHY.
Technical rept.,
Woods Hole Oceanographic Institution Mass
M. Blumer, and W. D. Snyder. Jul 67, 14p Rept no. WHOI-Ref-67-39
Contract N00014-66-C-0241
Availability: Published in Chemical Geology v2 p35-45 1967.

Descriptors: (*Sedimentation, *Shale), (*Porphyrins, Shale), Geochemistry, Deposits, Carbon, Pigments, Molecular weight, Chromatographic analysis, Tables, Esters, Tests.

The porphyrin pigments in extracts of the Triassic oil shale of Serpiano (Switzerland) were separated by gel permeation chromatography over alkylated Sephadex (LH-20) and Styragel. Evidence is presented for the existence of homologous series of pigments extending into the high molecular weight region (above 20,000 mol. wt.). These pigments are believed to be the products of heterogeneous polymerization of porphyrins derived from biological sources with the bulk organic matter of the sediment. The geochemical significance of this finding is discussed. (Author)
AD-656 223 Not available from CFSTI.

THE STRUCTURE OF THE M'-PHASE OF YTaO4, A THIRD FERGUSONITE POLYMORPH,
Aerospace Corp El Segundo Calif Labs Div
For primary bibliographic entry see Field 20B.
AD-656 335 HC$3.00 MF$0.65

STUDY OF POLYTYPIC PHASE RELATIONS AMONG COMPLEX INORGANIC STRUCTURES.
Michigan Univ Ann Arbor Dept of Geology and Mineralogy
For primary bibliographic entry see Field 20B.
AD-656 497 HC$3.00 MF$0.65

CRUSTAL STUDIES CONTINUATION OF BASIC RESEARCH IN CRUSTAL STUDIES.
Texas Instruments Inc Dallas Science Services Div
For primary bibliographic entry see Field 8K.
AD-656 778 HC$3.00 MF$0.65

THE FELDSPARS PHASE RELATIONS, OPTICAL PROPERTIES, AND GEOLOGICAL DISTRIBUTION.
Polevye Shpaty Fazovye Vzaimootnosheniya, Opticheskie Svoistva, Geologicheskoe Raspredelenie
Israel Program for Scientific Translations, Ltd., Jerusalem.
A. S. Marfunin. 1966, 328p TT-65-50091
Transl. Into English From Izd. Akad. Nauk Sssr (Moscow), 1966 Published By Dept. of Interior and Nsf Its Issue 78

Descriptors: *Geology, *Mineral, *Optical property, Distribution, Feldspar, Optical, Phase, Potassium, Property, Rock, Sodium.

For abstract, see STAR 05 18.
N67-31645 HC$3.00 MF$0.65

Group 8G—Geology and mineralogy

A STUDY OF THE EASTERN INDUSTRIAL COAL MARKET.
Booz, Allen and Hamilton, Inc., Washington, D.C.
15 Jun 67, 157p
Contract DI-14-01-0001-489
Prepared for Office of Coal Research, Washington, D. C.

Descriptors: (*Coal, *Economics), Industries, Fuel consumption, Costs, Transportation, Labor, Fuel oil, Commerce, Natural resources, Law, Electric power production, Tables, Efficiency, Industrial equipment.

The study analyzes the present and future industrial market for coal in the eastern United States. Specific study objectives were: Determination of industrial coal demand through 1975; Identification of significant industrial opportunities for coal; Development of a program for action to exploit effectively the full potential of identified opportunities. The report is largely confined to a summary of the more helpful information from the viewpoint of increasing the use of coal. The study itself involved far more comprehensive and intensive coverage of the industrial fuel market. It is estimated that consumption of coal by selected Eastern industries will continue to increase during the next decade. Assuming that the present delivered price differential of coal over other fuels can be maintained and that coal can retain its current competitive advantage regarding availability, it is expected to maintain the same annual rate of growth in the industrial fuel market during the next 10 years that it has had during the past decade, i.e., almost 1% annually. In absolute terms, it is projected that Eastern industry will consume between 86 million and 97 million tons of coal in 1975, compared with the 81 million tons consumed in 1962.
PB-175 601 HC$3.00 MF$0.65

INVESTIGATION OF ROCK SLOPE PROTECTION MATERIAL.
California State Div. of Highways. Materials and Research Dept.
For primary bibliographic entry see Field 13B.
PB-175 638 HC$3.00 MF$0.65

AN INVESTIGATION OF SILLIMANITE IN KNOX COUNTY, MAINE.
Sewall (James W.) Co., Old Town, Maine.
Jul 65, 24p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Rock (Geology), Maine), Sampling, Microscopy, Quantitative analysis, Minerals, Natural resources, Maps.
Identifiers: Area redevelopment.

The report was prepared through funds available under the Area Redevelopment Administration, U. S. Department of Commerce. It consists of an investigation of sillimanite in Knox County, Maine as recommended in the Final Report of the Knox County Regional Comprehensive Plan, Phase II - Natural Resources, 1964, which was prepared for the Knox County Regional Planning Commission assisted by funds available under the Urban Planning Grant from the Housing and Home Finance Agency, Section 701, of the Housing Act of 1954 as amended and the State of Maine Department of Economic Development. Field examination and collection of samples for microscopic analysis was delayed until late May, 1965 due to snow cover. Microscopic study, crushing, grinding, sizing and chemical analysis were completed by late June. (Author)
PB-175 642 HC$3.00 MF$0.65

GEOLOGIC AND ENGINEERING PROPERTIES INVESTIGATIONS.
Final rept.,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
R. J. Lutton, and F. E. Girucky. Sep 66, 131p
Report on Project Sulky.

Descriptors: (*Geology, *Engineering) (*Nuclear explosions, *Cratering), Basalt, Detonations, Rock (Geology), Rupture, Blast.

For abstract, see NSA 21 15.
PNE-720F HC$3.00 MF$0.65

8H. Hydrology and Limnology

ON THE DETERMINATION OF THE THICKNESS OF THE BAROCLINIC LAYER OF THE SEA,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 8C.
AD-656 698 HC$3.00 MF$0.65

ELECTRONIC COMPUTER PROGRAM FOR FLOOD RECORD COMPILATION AND FREQUENCY PLOT,
Bureau of Public Roads, Washington, D. C. Office of Research and Development.
Richard C. Tennent, and Lawrence J. Harrison.
May 67, 71p

Descriptors: (*Computer programs, *Information retrieval), (*Rivers, *Floods), Flow charting, Records, Input-output devices, Punched cards, Civil engineering.

This booklet describes a method whereby annual maximum flood records can be stored, retrieved and displayed for use by engineers involved in the design of a stream crossing. The data is the annual flood data published by the U. S. Geological Survey in their water supply papers. The graphical display of the data is based on a Gumbel recurrence interval. The computer system was developed in order to allow for as frequent as required updating of the frequency plots. The manual updating of the plot is time-consuming due to the need for recalculating the return period each time a new flood record is added. However, through the use of the computer, the flood record can be updated and the frequency plot generated automatically. This revised edition is published in order to clear up some inconsistencies encountered in the frequency plot and gaging station index. The frequency plot has been revised to change the method of printing the vertical scale. The index has necessitated an increase in the size of tables used for creating the gaging station index. These changes are in the computer program entitled, 'Flood Record Reports.' (Author)
PB-175 511 HC$3.00 MF$0.65

8J. Physical Oceanography

BIBLIOGRAPHY OF REPORTS, 1962.
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 8A.
AD-416 398 HC$3.00

MEASUREMENT AND INTERPRETATION OF MOTIONAL ELECTRIC FIELDS IN THE SEA.
Doctoral thesis,
Massachusetts Inst of Tech Cambridge Dept of Geology and Geophysics
Thomas B. Sanford. May 67, 162p
Contract Nonr-1841 (74)

Descriptors: (*Electric fields, *Sea water), (*Oceanology, Theses), Electric currents, Distribution, Magnetic fields, Voltage, Gulf stream, Gek data, Hydrology, Ocean currents.

The total motional electric current distribution is investigated for a quasi-steady, 3-dimensional ocean current. In order that electric currents associated with time variations in the induced magnetic field be negligible, a restriction is placed on the temporal and spacial variations of the flow. The quasi-static electric potential is calculated for a general flow and for a model of the Gulf Stream. The 3-dimensional solution for the electric potential is particularized for a 2-dimensional current which is broad compared with the ocean's depth. It is shown that for such a broad flow the electric current stream function is proportional to a transport function. The surface expression and total structure of the electric current are calculated for several simple flows and for a cross section of the Gulf Stream. A detailed comparison of several GEK traverses across the Gulf Stream taken in conjunction with hydrographic sections reveals the presence of inertial period oscillations in the surface layers.
AD-655 891 HC$3.00 MF$0.65

NCEL OCEAN ENGINEERING PROGRAM, MARCH 1966-MARCH 1967.
Naval Civil Engineering Lab Port Hueneme Calif
For primary bibliographic entry see Field 13J.
AD-656 453 HC$3.00 MF$0.65

TRACK CHARTS AND BATHYMETRY, USNS JOSIAH WILLARD GIBBS (T-AGOR 1) OPERATION 240, NORTH ATLANTIC OCEAN, 21 SEPTEMBER 1966-3 OCTOBER 1966.
Technical rept.,
Columbia Univ Dobbs Ferry N Y Hudson Labs
H. S. Fleming, and N. Z. Cherkis. Apr 67, 54p
Rept no. TR-137
Contract Nonr-266 (84)

Descriptors: (*Oceanology, *Atlantic ocean), (*Bathythermograph data, Atlantic ocean), Maps, Scientific research, Spain, Bermuda.

The report contains the charts of the cruise of the USNS Josiah Willard Gibbs (T-AGOR 1), Operation 240, in the North Atlantic Ocean en route from Bermuda to Rota, Spain, via Gorringe Bank (Ormonde Seamount). The track of the entire cruise is shown on 20 charts which have been prepared as overlays to U. S. Naval Oceanographic Office BC charts 0607N, 0606N, 0506N, 0406N, 0306N, 0307N, 0207N, 0107N. Also included are charts containing the track and contours of a survey on the northern slope of Ormonde Seamount on Gorringe Bank. (Author)
AD-656 718 HC$3.00 MF$0.65

MICROTOPOGRAPHY OF THE BLAKE-BAHAMA REGION.
Technical rept.,
Lamont Geological Observatory Palisades N Y
G. M. Bryan, and R. G. Markl. Dec 66, 59p Rept no. TR-8
Contract NObsr-85077

Descriptors: (*Bahama Islands, Ocean bottom topography), (*Ocean bottom, *Erosion), Predictions, Anomalies, Sedimentation, Oceanographic vessels, Scattering, Ocean currents, Mathematical models, Flow fields.
Identifiers: Blake-Bahama region.

Sea floor microtopography has been shown to have an adverse effect on bottom loss. An attempt has been made through analysis of 12 kc PDR echograms to define (1) the range of wavelengths and (2) the origin, of corrugations observed in the Blake-Bahama Basin and Blake Outer Ridge provinces, as well as to delineate their areal extent. (Author)
AD-656 719 HC$3.00 MF$0.65

8K. Seismology

METHOD FOR RECOGNIZING REPEATED PULSE SEQUENCES IN A SEISMOGRAM,
Pennsylvania State Univ University Park Dept of Geology and Geophysics

B. F. Howell, Jr., P. M. Lavin, R. J. Watson, Y. Y. Cheng, and J. L. Lin. 17 Oct 66, 13p Rept no. Scientific-7
AFCRL-66-735
Contract AF 19 (628)-238, ARPA Order-180-61
Availability: Published in Journal of Geophysical Research v72 n12 p3225-32 Jun 15 1967.

Descriptors: (*Seismic waves, *Seismology), Earthquakes, Velocity, Nuclear explosions, Epicenter, Surface properties, Reflection, Tables, Energy, Noise.

A seismogram may be treated as the sum of a primary wave train, secondary wave train, and noise. Assuming the secondary has the same waveform as the primary, and arrives a time delta t behind it with a relative strength R, a deconvolved seismogram which is an estimate of the primary seismogram can be found for every delta t. It is postulated that at delta t's close to those of real secondaries, especially pP, the deconvolved seismogram will be simplified. A test based on the decrease in energy represented by the deconvolved seismogram is proposed with empirical justification by which such times can be determined. This method of recognizing secondaries is tested on 14 seismograms of the 10 May 1963 Ecuador earthquake and on 14 nuclear-blast seismograms. It picks out secondaries, but it finds many other pulses besides pP; and it does not always find pP. (Author)
AD-656 212 Not available from CFSTI.

RESPONSE OF SEISMIC ARRAYS TO WIDEBAND SIGNALS.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 9E.
AD-656 344 HC$3.00 MF$0.65

LARGE APERTURE SEISMIC TELEMETERING SYSTEM FOR CENTRAL ALASKA.
Scientific rept.,
Alaska Univ College Geophysical Inst
Eduard Berg, Norbert Sperlich, and William Feetham. May 67, 50p Rept no. UAG-R-188
Grant AF-AFOSR-701-66, ARPA Order-292-66

Descriptors: (*Seismological stations, *Telemeter systems), (*Alaska, Earthquake warning systems), Earthquakes, Detection, Seismic waves, Meteorological parameters, Seismometers, Design, Site selection, Electronic equipment.

The Geophysical Institute has established and now operates a large aperture seismic telemeter network in Alaska. At present four stations are operated and two more will be added shortly. The system is described in its technical details, including the remote site equipment and the method of recording at the Geophysical Institute. Without the use of methods for improving signal-to-noise ratio (such as velocity and/or frequency filtering) the sensitivity of the seismic stations for detecting distant earthquakes is similar to that of the U.S.C. + G.S. College Observatory. This sensitivity allows recording of earthquakes down to magnitude 4 (U.S.C. + G.S. magnitude) in the 80 degree distant range. Epicenter maps for three 1-month periods for interior and coastal Alaska are presented. The installation of the Black Rapids station (BLR) has been completed. (Author)
AD-656 688 HC$3.00 MF$0.65

CRUSTAL STUDIES CONTINUATION OF BASIC RESEARCH IN CRUSTAL STUDIES.
Final rept.,
Texas Instruments Inc Dallas Science Services Div
Max K. Miller, A. Frank Linville, and Hugh K. Harris. 15 Jul 67, 118p
AFOSR-67-1581
Contract AF 49 (638)-1588, ARPA Order-292

See also AD-648 149.

Descriptors: (*Lithosphere, Models (Simulations)), (*Seismic waves, Propagation), Seismometers, Earthquakes, Scattering, Epicenter, Antenna arrays, Power spectra, Antenna apertures, Excitation, Mathematical analysis, Reverberation, Velocity, Signals, Measurement, Rayleigh waves.
Identifiers: LASA.

The final report of work performed under the Crustal Studies Contract AF 49 (638)-1588 is divided into two main areas: theoretical dispersion calculations and experimental measurements of the fundamental Rayleigh wave at the Large Aperture Seismic Array (LASA) in Montana, and a study of teleseismic signals using analog model data. Two earthquakes recorded on the long-period seismometers at LASA, were used for dispersion analysis. Epicenters of these two events were located off the northern California coast and in the Greenland Sea. Good agreement in the dispersion estimates was obtained using three recording stations. The significance of the results, which covered a frequency band of 0.025 through 0.0625 cps, lies in the fact that this frequency band is, theoretically, where the greatest dispersion occurs. The results obtained agree qualitatively with previously known results. An analog model having a crustal layer with an abrupt thickness change (3 to 5 cm) was used for studies of surface-wave scattering from surface irregularities and a lateral inhomogeneity. The analysis of surface-wave scattering was a continuation of work previously done. The model also was used for a study of teleseismic signals by placing the source crystal on the bottom of the model. For an upcoming-plane P wave, reverberation effects, the lateral inhomogeneity (including the expected focusing of energy into the thick end by the dipping segment of the crustal layer), and P- and S-wave conversions at the crustal layer interface caused a complex interference pattern that was observed on the surface recordings. (Author)
AD-656 778 HC$3.00 MF$0.65

8L. Snow, Ice, and Permafrost

PHASE COMPOSITION OF FROZEN MONTMORILLONITE-WATER MIXTURES FROM HEAT CAPACITY MEASUREMENTS.
Cold Regions Research and Engineering Lab Hanover N H
For primary bibliographic entry see Field 8M.
AD-656 601 HC$3.00 MF$0.65

A SNOW INDEX.
National Meteorological Center, Suitland, Md.
For primary bibliographic entry see Field 4B.
PB-175 641 HC$3.00 MF$0.65

8M. Soil Mechanics

LARGE AMPLITUDE VIBRATION EFFECTS ON THE SHEAR MODULUS OF SAND.
Final rept.,
Michigan Univ Ann Arbor
Vincent P. Drnevich, John R. Hall, Jr., and Frank E. Richart, Jr. Oct 66, 85p
AEWES-CR-3-161
Contract DA-22-079-eng-340
Availability: Hard copy available from Waterways Experiment Station, Vicksburg, Miss. $1.50.

Descriptors: (*Soil mechanics, *Sand), Vibration, Shear stresses, Mechanical properties, Equations of motion, Measurement, Resonant frequency, Tests, Rotation, Tables.

The report is concerned with the effect of large amplitude steady-state vibrations on the shear modulus of sands. The torsional resonant column method was employed for this research using two specially constructed devices. One device torsionally oscillates a 4 cm diameter, 27 cm long solid cylindrical specimen while the second device tests a hollow cylinder of sand having a 4 cm inside diameter, a 6 cm outside diameter, and a 30 cm length. The purpose of the hollow cylinder was to obtain a more uniform shear strain throughout the sample. The aim of the two testing programs was to determine the shear modulus of C-190 Ottawa sand as a function of void ratio and confining pressure before and after large amplitude torsional vibration had been applied. The effect of large amplitude vibration was to increase the low amplitude shear modulus by as much as 100 percent. The increase could not be accounted for on the basis of void ratio change. Vibration amplitude (shear strain amplitude in the hollow specimen) and cycles of torsional vibration are considered in presenting the data. The increase in low amplitude shear modulus was accompanied by an increase in damping indicating a change in the mechanical characteristics of the sample caused by the different patterns of vibration history. (Author)
AD-655 865 MF$0.65

PHASE COMPOSITION OF FROZEN MONTMORILLONITE-WATER MIXTURES FROM HEAT CAPACITY MEASUREMENTS.
Research rept.,
Cold Regions Research and Engineering Lab Hanover N H
Duwayne M. Anderson. May 67, 17p Rept no. CRREL-RR-218

Descriptors: (*Montmorillonite, Phase studies), (*Soils, Freezing), Ice, Water, Equations of state, Specific heat, Calorimetry.
Identifiers: Heat capacity.

Equations are presented which form the basis of a method for determining the unfrozen water content of frozen clay-water mixtures from heat capacity measurements. The heat capacity of frozen sodium-montmorillonite water mixtures was determined at -4.7 and -9.6C with a Calvet Microcalorimeter. The data were then used in conjunction with the method described to obtain the unfrozen water content of these clay water mixtures. The data obtained indicate that the method is applicable at temperatures below about -5C. The amount of unfrozen water found in the frozen clay-water mixtures at -5 to -10C is equivalent to an interfacial surface layer of water of from one to two molecular diameters in thickness. Most of this water can be accommodated and is thought to be located in interlamellar regions. (Author)
AD-656 601 HC$3.00 MF$0.65

SECONDARY CHANGES IN THE STRENGTH OF CLAY LAYERS AND THE ORIGIN OF SENSITIVE CLAYS,
Stockholm Univ. (Sweden). Dept. of Quarternary Research.
Oskar A. Talme, Maret Pajuste, and Carl-Goesta Wenner. 1966, 136p Byggforshningen-46:1966

Descriptors: (*Clay, *Soil mechanics), Stratigraphy, Chemical properties, Sampling, Thickness, Physical properties, Avalanches, Particle size, Quantitative analysis, Drainage, Ions, Tables, Water, Conductivity, Sensitivity, Construction, Sweden.

Knowledge of the origin of quick clay and of secondary changes in strength is of importance for construction purposes as well as for the prevention of landslides. A detailed study was made of adjacent clays in the same layer and of the same age - but with differing sensitivity. The clay and its pore water were analysed physically and chemically. Different analyses indicated that the sensitivity depends on physical-chemical conditions in the pore water of the clay. By experiments it was demonstrated that quick clay can develop from normal clay through leaching. Quick clay can also be changed to normal clay if the pore water of the nor-

mal clay is replaced by pore water of quick clay. Finally, quick clay can be restored to solid normal clay by replacing its pore water by pore water of normal clay, or by an artifical solution prepared on the basis of chemical pore water analyses. The results are now being applied to research into the stabilisation of soft clay in nature by chemical means. (Author)
PB-175 663 HC$3.00 MF$0.65

8N. Terrestrial Magnetism

RESEARCH DIRECTED TOWARD REFINEMENT OF GEODETIC TECHNIQUES UTILIZING TERRESTRIAL AND SPATIAL CONFIGURATIONS.
Georgetown Coll Washington D C Observatory
For primary bibliographic entry see Field 3A.
AD-655 933 HC$3.00 MF$0.65

TEXAS BIANNUAL OF ELECTRONICS RESEARCH, NO. 5.
Texas Univ Austin Labs for Electronics and Related Science Research
For primary bibliographic entry see Field 9C.
AD-656 349 HC$3.00 MF$0.65

STUDY OF THE EARTH'S MAGNETIC FIELD WITH THE AID OF RADIATION BELTS.
Izucheniye Magnitnogo Polya Zemli Pri Pomoshchi Radiatsionnykh Poyasov
Volt Technical Corp., Washington, D. C.
S. N. Kuznetsov. 22 May 67, 5p NASA-CR-84860, ST-GM-PF-10606
Contract NAS5-12487
Transl. Into English From Geomagnetizm I Aeronomiya (Moscow), V. 7, No. 2, 1967 P 342-344

Descriptors: *Elektron satellite, *Magnetospheric electron density, Axis, Current, Density, Detection, Dipole, Earth, Electron, Elektron i satellite, Elektron ii satellite, Equator, Field, Flight, Geomagnetic, Inclination, Magnetic, Magnetosphere, Plane, Ring, Rotation, Satellite.

For abstract, see STAR 05 18.
N67-31839 HC$3.00 MF$0.65

ISOGONIC MAP OF AUSTRALIA AND NEW GUINEA FOR THE EPOCH, 1965.0.
Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia).
J. Van Der Linden. 1965, 15p REPT.-98

Descriptors: *Australia, *Magnetic survey, *New zealand, Change, Declination, Density, Epoch, Field, Magnetic, Map, Survey, Variation.

For abstract, see STAR 05 18.
N67-31976 HC$3.00 MF$0.65

GIPPSLAND BASIN AIRBORNE MAGNETIC SURVEYS, VICTORIA, 1951-52 AND 1956.
Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia).
J. H. Quilty. 1965, 35p REPT.-95

Descriptors: *Australia, *Magnetic survey, Airborne, Anomaly, Basement, Contour, Correlation, Depth, Geology, Magnetic, Map, Method, Rock, Structure, Survey, Trend.

For abstract, see STAR 05 18.
N67-32109 HC$3.00 MF$0.65

MAGNETIC MEAN HOURLY VALUES FROM WATHEROO OBSERVATORY, WESTERN AUSTRALIA, 1955-1966.
Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia).
P. M. Mc Gregor. 1966, 122p REPT.-119

Descriptors: *Australia, *Magnetic measurement, Activity, Coefficient, Day, Diurnal, Element, Fourier analysis, Hour, Magnetic, Magnetogram, Mean, Measurement, Month, Quiet, Scale, Temperature, Value, Variation.

For abstract, see STAR 05 18.
N67-32110 HC$3.00 MF$0.65

MAGNETIC MEAN HOURLY VALUES FROM WATHEROO OBSERVATORY, WESTERN AUSTRALIA, 1957 - 1958.
Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia).
P. M. Mc Gregor. 1966, 122p REPT.-120

Descriptors: *Australia, *Earth atmosphere, *Geomagnetic storm, *Geophysical observatory, *Magnetic measurement, *Table, Atmosphere, Average, Coefficient, Earth, Fourier analysis, Geomagnetic, Geophysics, Horizontal, Hour, Intensity, Magnetic, Mean, Measurement, Meteorology, Month, Observatory, Storm, Upper, Vertical.

For abstract, see STAR 05 18.
N67-32364 HC$3.00 MF$0.65

MAGNETIC MEAN HOURLY VALUES FROM WATHEROO OBSERVATORY, WESTERN AUSTRALIA, 1948-1950.
Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia).
P. M. Mc Gregor. 1966, 174p REPT.-110

Descriptors: *Australia, *Earth atmosphere, *Geomagnetic storm, *Geophysical observatory, *Magnetic measurement, *Table, Atmosphere, Average, Earth, Field, Fourier analysis, Geomagnetic, Geophysics, Horizontal, Hour, Intensity, Magnetic, Mean, Measurement, Meteorology, Month, Observatory, Storm, Upper, Value, Vertical.

For abstract, see STAR 05 18.
N67-32365 HC$3.00 MF$0.65

MAGNETIC MEAN HOURLY VALUES FROM WATHEROO OBSERVATORY, WESTERN AUSTRALIA, 1951-1952.
Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia).
P. M. Mc Gregor. 1966, 121p REPT.-111

Descriptors: *Australia, *Earth atmosphere, *Geomagnetic storm, *Geophysical observatory, *Magnetic measurement, *Table, Atmosphere, Average, Earth, Fourier analysis, Geomagnetic, Geophysics, Horizontal, Hour, Intensity, Magnetic, Mean, Measurement, Meteorology, Month, Observatory, Storm, Terrestrial, Upper, Vertical.

For abstract, see STAR 05 18.
N67-32366 HC$3.00 MF$0.65

ERRORS AND LIMITATIONS OF THE MAGNETIC COMPASS.
Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia).
W. D. Parkinson. 1965, 19p REPT.-92

Descriptors: *Geomagnetic field, *Instrument error, *Magnetic compass, Accuracy, Artificial, Compass, Delineation, Effect, Error, External, Field, Geomagnetic, High latitude, Instrument, Limitation, Local, Magnetic, Main, Map, Performance, Secular, Variation.

For abstract, see STAR 05 18.
N67-32367 HC$3.00 MF$0.65

9. ELECTRONICS AND ELECTRICAL ENGINEERING

9A. Components

ORDNANCE ENGINEERING DESIGN HANDBOOK: SERVOMECHANISMS. SECTION 2: MEASUREMENT AND SIGNAL CONVERTERS, CONSISTING OF CHAPTERS 11-12.
Office of the Chief of Ordnance Washington D C
For primary bibliographic entry see Field 19D.
AD-655 862 HC$3.00 MF$0.65

ELECTROSTATIC FOCUSING OF HOLLOW SPIRALING ELECTRON BEAMS.
Triannual rept. no. 1, 1 Nov 66-30 Mar 67,
City Coll Research Foundation New York
Morris Ettenberg. Jul 67, 18p
ECOM-0159-1
Contract DAAB07-67-C-0159

Descriptors: (*Electron beams, Focusing), Electron tube parts, Electrostatics, Cathodes (Electron tubes), Electroforming, Electrons, Space charges, Microwave equipment.

The purpose of this research is to study, experimentally and theoretically, the injection and focusing of hollow electron beams by electrostatic means. In order to accomplish this type of focusing the electrons must have an angular velocity about the focusing electrode which provides them with a centrifugal force. A program has been started to form the cathode for spiraling beam injection by electroforming. It is planned to use this cathode in an end-fire injection scheme. A computer study of electron trajectories under electrostatic focusing including space charge has been initiated. (Author)
AD-655 914 HC$3.00 MF$0.65

COMPUTER EXPERIMENTS ON LOW DENSITY CROSSED-FIELD ELECTRON BEAMS.
Avco Everett Research Lab Everett Mass
For primary bibliographic entry see Field 9B.
AD-655 932 HC$3.00 MF$0.65

REFLECTIONS FROM ROTARY-VANE PRECISION ATTENUATORS.
Revised ed.,
Minnesota Univ Minneapolis Dept of Electrical Engineering
J. D. Holm, D. L. Johnson, and K. S. Champlin.
30 Aug 66, 4p
AFOSR-67-1654
Grants AF-AFOSR-606-64, NSF-GP-2360
Revision of manuscript submitted 9 Jun 66.
Availability: Published in IEEE Transactions on Microwave Theory and Techniques vMTT15 n2 p123-4 Feb 1967.

Descriptors: (*Attenuators, Reflection), Microwaves, Measurement, Matrix algebra, Theory, Scattering, Functions.

In practice, absorbing vanes of rotary-vane attenuators always reflect a small amount of incident power. As a result, scattering coefficient S sub 11 and S sub 22 are not zero and are, in fact, functions of attenuator setting. This paper derives an equation relating S sub 11 and S sub 22 to the vane angle theta by considering the effect of small reflections from vanes of an otherwise perfect attenuator. (Author)
AD-655 954 Not available from CFSTI.

RELIABILITY AND OPTIMUM DESIGN OF THE INTERCONNECTIONS OF A POWER SYSTEM.

Northeastern Univ Boston Mass Dept of Electrical Engineering
For primary bibliographic entry see Field 9C.
AD-655 962 Not available from CFSTI.

APPLICATION OF PVC WIRE INSULATION BY FLUIDIZED BED METHODS,
Diamond Alkali Co Painesville Ohio
For primary bibliographic entry see Field 13H.
AD-656 060 HC$3.00 MF$0.65

IMPROVED GROUND-SUPPORT MULTI-CONDUCTOR CABLES FOR MISSILE SYSTEMS.
Frankford Arsenal Philadelphia Pa
1962, 19p
Prepared for presentation at Wire and Cable Symposium (11th), Nov 1962.

Descriptors: (*Electric cables, *Ground support equipment), Guided missiles, Specifications, Electromagnetic shielding, Electric insulation, Weight, Costs, Effectiveness.

Consistent with present day military logistic concepts for miniaturization of electrical and electronic components, there has been an increasing need to reduce size, weight and cost of ground support multiconductor cable of the type covered in Military Specification MIL-C-13777. There has also been a need to evaluate the requirements of this specification in light of the numerous deviations being specified by various users of this cable, with a view towards standardization of the most appropriate materials, construction details and performance requirements that should be used in Military Systems. The purpose of this article is to discuss what is being done to meet these needs, and to review recent data which will be used to establish more uniform and realistic specification requirements.
AD-656 061 HC$3.00 MF$0.65

ZETAFIN: COPOLYMER COMPOSITIONS FOR THE WIRE AND CABLE INDUSTRY,
Dow Chemical Co Freeport Tex Texas Div
For primary bibliographic entry see Field 11I.
AD-656 062 HC$3.00 MF$0.65

AN ENVIRONMENTAL HIGH PERFORMANCE, RUGGED SILICONE CABLE DESIGN FOR MISSILE APPLICATION,
Picatinny Arsenal Dover N J Army Explosive Ordnance Disposal Center
A. R. Blanck. Nov 62, 33p
Prepared for presentation at the Annual Wire and Cable Symposium (11th), Asbury Park, N. J., 28-30 Nov 62.

Descriptors: (*Electric cables, Guided missiles), (*Silicone plastics, *Electric insulation), Electrical properties, Design, Electric wire, Coatings, Electric connectors, Physical properties.

The paper describes the development of a high performance silicone cable design having a high resistance to adverse military environments encountered in the tropic, temperate, and arctic zones. By careful selection of materials of construction and by development of specialty silicone compounds, a cable design has been achieved having a degree of ruggedness comparable to designs with other materials. By virtue of low moisture absorption, low dielectric constant and high volume resistivity inherent in silicone elastomers, the cable design has low cross capacitance and high insulation resistance in the presence of moisture and at high temperatures. (Author)
AD-656 063 HC$3.00 MF$0.65

EXTRUDING HIGH DENSITY POLYETHYLENE FOR QUALITY AND SAVINGS,
Grace (W R) and Co Clarksville Md
For primary bibliographic entry see Field 13H.
AD-656 065 HC$3.00 MF$0.65

NEW APPROACHES TO LOW LOSS FLEXIBLE COAXIAL CABLE DESIGNS,
Amphenol-Borg Electronics Corp Danbury Conn
Orlando A. Mannella, and Morton Pomerantz.
Nov 62, 30p
Contract DA-36-039-sc-87467
Prepared for presentation at the Annual Wire and Cable Symposium (11th), Asbury Park, N. J., 28 Nov 62.

Descriptors: (*Coaxial cables, Mechanical properties), Design, Dielectrics, Stability, Dielectric properties, Polyethylene plastics, Halocarbon plastics, Electric connectors, Performance (Engineering), Attenuation, Standing wave ratios.

Unique dielectric and outer conductor constructions combined with optimized jacketing have produced flexible, low-loss cables possessing a high degree of stability. Current effort in this program is being directed in the areas of possible reduction of dielectric loss, substitution of polyethylene for Teflon to reduce costs, and the development of suitable connectors for terminating the cables. It is planned to utilize QL connectors for the larger cables (US-5 and US-10) and N connectors for the US-15 cable. The significant reduction in conductor loss achieved by the copper tape wrap and braid design has suggested extrapolation of this technique to standard solid dielectric cables. This construction also gives rise to the expectation of improved shielding characteristics. (Author)
AD-656 067 HC$3.00 MF$0.65

RESEARCH AND DEVELOPMENT OF HIGH TEMPERATURE, HIGH POWER RADIO FREQUENCY TRANSMISSION LINES FOR 350C AND 825C,
Andrew Corp Orland Park Ill
H. L. Woodbury. 1967, 43p
Contracts AF 33 (616)-7389, AF 33 (616)-5189
Prepared for presentation at Symposium on Communication Wires and Cables (11th).

Descriptors: (*Coaxial cables, High-temperature research), Transmission lines, Manufacturing methods, Dielectrics, Electric connectors, Radiofrequency power, Aircraft, Guided missiles, Spacecraft.

The paper will describe the development of two high temperature, low-loss, coaxial cables for operation in the -65 to 350C and -100 to 825C temperature ranges. These cables were developed primarily for use on aircraft, missiles and space vehicles. The high temperature requirements exist because the cable path may lead from the relatively cool areas of cockpit environments to the extremely hot external surfaces of a vehicle.
AD-656 068 HC$3.00 MF$0.65

THE DEVELOPMENT AND APPLICATION OF A PRACTICAL FLAT CABLE AND CONNECTING METHOD,
Minnesota Mining and Mfg Co St Paul
Edward E. Leach, and Robert A. Elm. 1962, 20p
Presented at the Signal Corps Wire and Cable Symposium, Asbury Park, N. J., 28-30 Nov 1962.

Descriptors: (*Electric cables, Configuration), Electric connectors, Design, Polyester plastics, Polyethylene plastics, Copper, Wire, Electric insulation, Geometric forms, Telephone lines.

The paper presents a development and application survey of a basic method of wiring, using flat cable and specifically designed connector components, both in the modular concept for compact wiring, and in the pressure sensitive adhesive concept for telephone use. The modular concept applied to round wire flat cable, coupled with a simple and rapid connecting means, offers a versatile wiring system with relatively few standard components. Although this system makes no attempt to cover the wide range of electrical and mechanical requirements that exist, a general purpose cable has been developed and should offer a significant contribution to the progress of flat cable usage. The reliability and labor-saving advantages of the pressure-sensitive adhesive cable system appear, at this time, to have been proven for several applications, and further development work will, no doubt, open the doors to other uses, such as public address, page call, intercommunications, home audio and low voltage wiring. (Author)
AD-656 069 HC$3.00 MF$0.65

COMMUNICATION CABLES WITH WELDED AND CORRUGATED METALLIC SHEATHS,
Hackethal-Draht-Und Kabel-Werke Ag Hanover (West Germany)
Karl Andresen, and Dimitri R. Stein. 1962, 21p
Annual Wire and Cable Symposium (11th), Asbury Park, N. J., November 28, 1962.

Descriptors: (*Electric cables, Metal coatings), Aluminum, Welding, Machines, Manufacturing methods.

A new manufacturing process is described for welding and corrugating cable sheaths. This process makes it possible to use practically all metals which may be of interest for cable sheaths. Moreover, it allows a wide range of wall thicknesses. The resulting sheath is fluid-impervious and combines light weight, exceptional dimensional stability and compression strength with excellent pliability and corrosion resistance. The unusual combination of desirable characteristics has brought about a rapid acceptance of the Wellmantel sheath and its introduction in many countries for numerous cable applications. To date 52 Wellmantel machines are in operation or on order in Europe and in the United States. Since 1951 a total of about 20,000 miles of cables with steel, copper or aluminum Wellmantel sheath have been produced by Hackethal and its licensees. This is a clear indication of the technical and economic merits of the Wellmantel process. The Wellmantel sheath was first introduced in the United States in 1953. Since then, through the pioneering work of our American licensees, the Wellmantel design has found many applications, particularly in the field of communication cables (27). For example, its unique balance of characteristics has led to the design of an extremely vital communication cable which is presently being produced in large quantities. In our paper we have discussed several specific European Wellmantel cable types and their properties. These examples were intended as illustrations of the possibilities which are inherent in the Wellmantel design.
AD-656 070 HC$3.00 MF$0.65

LIGHTNING PROTECTION FOR UNDERGROUND CABLES,
Union Carbide Corp New York Plastics Div
Charles Lowe. Nov 62, 12p
Prepared for presentation at the Annual Signal Corps Symposium, Asbury Park, N. J., 27-30 Nov 62.

Descriptors: (*Electric cables, *Lightning arresters), Underground, Coatings, Polyethylene plastics, Semiconductors.

High quality communication cables can be produced with semiconductive polyethylene coverings. These cables will have physical performance characteristics similar to those cables currently used, but offer the added benefit of an outer covering which will help maintain the shield at local ground potential and help dissipate voltage induced by lightning, thus reducing the possibility of damage. (Author)
AD-656 071 HC$3.00 MF$0.65

ENGINEERING AND MATERIAL CONSIDERATIONS IN BURIED PLANT,
Rural Electrification Administration Washington D C

C. R. Ballard, and P. M. Emmons. Nov 62, 27p
Prepared for presentation at the Annual Wire and Cable Symposium (11th), Asbury Park, N. J., 28-30 Nov 62.

Descriptors: (*Electric cables, Underground), Telephone lines, Physical properties, Electrical properties, Electrical engineering, Maintenance, Attenuation, Damage, Electric connectors, Installation.

First, buried plant was made practicable by an improvement in plowing methods through the development of plows capable of burying cable and wire directly in the soil without damage to cable or wire, at reasonably controlled depths and with a minimum displacement of the soil. The second major step was in the development of cable and wire satisfactory for direct burial in the ground. Along with this development of wire and cable it was necessary to develop satisfactory low-cost pedestals and other accessories to permit the splicing, loading, protection and termination of the cable and wire in the pedestals above ground free from exposure to ground moisture. These developments in plowing techniques and materials coupled with the utilization of sound engineering standards made buried plant a practical reality. The buried plant techniques resulted in systems or parts of systems being constructed at initial costs comparable or lower than costs of conventional aerial plant. Substantial savings are now being evidenced in the annual costs of operation and maintenance. Experience over the past five years indicate numerous advantages, among which are the simplification of right-of-way procurement, freedom from storm damage, the elimination of initial and annual tree clearing and trimming, simplification in the field procedures in the staking of the lines, greater safety through elimination of possible power contacts and of the climbing hazards, freedom from pole damage by automobiles, and substantially improved public relations through elimination of unsightly aerial structures. (Author)
AD-656 072 HC$3.00 MF$0.65

NEW DEVELOPMENTS IN THE MANUFACTURE OF COMMUNICATION CABLE AT OMAHA,
Western Electric Co Inc Omaha Neb
M. C. Schultz, R. D. Mallory, H. R. Jacobs, R. W. Rake, and L. W. Myers. Nov 62, 30p
Prepared for presentation at the Annual Wire and Cable Symposium, Asbury Park, N. J., November 28, 29 and 30, 1962.

Descriptors: (*Electric wire, Manufacturing methods), (*Electric cables, Manufacturing methods), Drawing (Machine processing), Polyethylene plastics, Electric insulation, Coatings, Copper, Polyvinyl chloride.

Contents: No. 1 wire drawing machine; Polyethylene wire insulating; Polyethylene wire twisting; Stranding cabler; Cable sheathing - polyethylene covered; Cable armoring; Electrical testing, sealing and gassing; Polyvinyl covered cable.
AD-656 073 HC$3.00 MF$0.65

HOT LIQUID VULCANIZATION OF SILICONE RUBBER INSULATED WIRE AND CABLE,
Dow Corning Corp Midland Mich
For primary bibliographic entry see Field 13H.
AD-656 074 HC$3.00 MF$0.65

A NEW METHOD FOR THE EXTRUSION AND VULCANIZATION OF QUALITY CABLE SHEATHS,
Pacific Automation Products Inc Glendale Calif
Don F. Goodwine. Nov 62, 17p
Prepared for presentation at the Annual Symposium on Communication Wires and Cables (11th), Asbury Park, N. J., 28-30 Nov 62.

Descriptors: (*Rubber coatings, *Electric cables), (*Extrusion, Coatings), Vulcanization, Manufacturing methods, Synthetic rubber.

A manufacturing process is described which permits rapid and economical production of quality cable products in a wide range of sizes and types, and utilizes equipment which is readily adapted to many other operations.
AD-656 075 HC$3.00 MF$0.65

DIFFUSION OF GASES THROUGH POLYETHYLENE CABLE JACKETS,
Whitney Blake Co New Haven Conn
For primary bibliographic entry see Field 11C.
AD-656 076 HC$3.00 MF$0.65

THE COOLING RATE OF POLYETHYLENE INSULATED WIRE DURING THE EXTRUSION PROCESS,
Bell Telephone Labs Inc Murray Hill N J
R. D. Biggs, and R. P. Guenther. Nov 62, 15p
Prepared for presentation at the Annual Wire and Cable Symposium (11th), Asbury Park, N. J., 29 Nov 1962.

Descriptors: (*Electric insulation, Polyethylene plastics), (*Electric wire, Cooling), Extrusion, Copper, Thermal properties, Capacitance, Liquid cooled.

During the manufacture of polyethylene insulated conductors, hot polyethylene is applied to the copper conductor in the head of an extruder. Immediately after the insulated conductor leaves the extruder head, it is cooled in a trough filled with water. This paper presents a method to determine the cooling rate of the polyethylene insulation as it passes through the water trough. (Author)
AD-656 077 HC$3.00 MF$0.65

SOLID POLYPROPYLENE INSULATION FOR WIRE AND CABLE APPLICATIONS,
United States Steel Corp Worcester Mass American Steel and Wire Div
For primary bibliographic entry see Field 11I.
AD-656 078 HC$3.00 MF$0.65

SILICONE INSULATED CABLES FOR NAVAL MARINE APPLICATION,
New York Naval Shipyard Brooklyn Material Lab
G. J. Thompson. Nov 62, 5p
Prepared for presentation at the Annual Wire and Cable Symposium (11th), Asbury Park, N. J., 28-30 Nov 62.

Descriptors: (*Electric cables, Silicone plastics), (*Silicone plastics, Electric insulation), Marine engineering, Performance (Engineering).

The paper discusses the development of silicone insulated cables for use on Navy ships.
AD-656 080 HC$3.00 MF$0.65

HIGH PERFORMANCE, SMALL DIAMETER CONTROL CABLE,
Du Pont de Nemours (E I) and Co Wilmington Del Plastics Dept
A. L. Gibson. 1966, 6p Rept no. Paper-628
Presented at Signal Corps Wire and Cable Symposium (11th) Asbury Park, N. J., 28-30 Nov 1962.

Descriptors: (*Electric cables, Design), Performance (Engineering), Electric insulation, Physical properties, Specifications.

The paper describes a particular design of a high performance, small diameter control cable which has now seen extensive and highly successful usage in industrial plants. In addition to providing safe and reliable service, these cables have resulted in over-all economies when utilized in today's modern automated plants.
AD-656 081 HC$3.00 MF$0.65

THE DESIGN AND DEVELOPMENT OF WIRE INSULATIONS FOR USE IN THE ENVIRONMENT OF OUTER SPACE.
Technical rept.,
Raychem Corp Redwood City Calif
V. L. Lanza, and R. M. Halperin. 1963, 15p
Prepared for presentation at Annual Symposium on Communication Wires and Cables (12th) held at Asbury Park, N. J., 4,5,6 Dec 1963.

Descriptors: (*Electric insulation, Space environmental conditions), Electric wire, Electric cables, Polyethylene plastics, Radiation damage, Dielectric properties, Weight, Effectiveness.

The parameters which define an acceptable space insulation are complex. For outer space applications it is not possible merely to test the ordinary chemical, physical, and electrical properties of a material. Special attention must be directed to measurements of those unique features which determine the compatibility of a material with the environment of outer space. Thus, such things as weight loss, weight loss rate, radiation resistance, gross weight, and condensables are properties which must be tested in a simulated space environment to predict accurately an insulated wire's effectiveness in outer space. No electrical insulating material had been specially designed to operate under these unique conditions. The development of Novathene was undertaken to fill this void. (Author)
AD-656 095 HC$3.00 MF$0.65

WIRE AND CABLE INSULATION PROBLEMS OF SPACE VEHICLES,
Lockheed Missiles and Space Co Sunnyvale Calif
For primary bibliographic entry see Field 11G.
AD-656 096 HC$3.00 MF$0.65

ENVIRONMENTAL SEALING OF CONNECTORS ON MILITARY CABLES,
Sandia Corp Albuquerque N Mex
G. Voida. Nov 63, 43p Rept no. SC-DC-3504

Descriptors: (*Electric connectors, *Embedding substances), Military requirements, Electric cables, Isocyanate plastics, Adhesives, Plastic seals, Chromates, Finishes + finishing, Non-destructive testing.

Excellent sealing of connectors on military cable assemblies against the entrance of moisture and water vapor was achieved with a polyurethane potting compound. The excellent sealing and adhesive qualities of the potting compound were found to depend on the application of the correct processing procedures. The cable assembly evaluated in this report withstood most of the thermal, humidity, and mechanical overtests that were applied. Both branches of eight cable assemblies and only one branch of four other assemblies exhibited shield resistances in excess of the required limits as a result of the environmental overtests. Out-of-tolerance shield resistances were attributed principally to discontinuities of the braid wire between the clamp plates. The discontinuities occurred because of (1) the relatively small percentage of wire braid that was securely clamped, (2) the tolerance buildup on the features of the clamp plates, and (3) physical changes that occurred to the wire during testing. Corrosion formation was not the cause of discontinuity between these parts. The Loctite adhesive produced an excellent bond between the jam nut and the connector shells and produced a permanent mechanical interlock between these parts. When properly applied and suitably converted, the chromate finishes on aluminum will effectively withstand accelerated environments and severe handling. Radiographic inspection of potted connectors is an effective nondestructive method

for determining quality of potting and quality of assembly workmanship. (Author)
AD-656 097 HC$3.00 MF$0.65

EXAMPLES OF EFFECT OF DIMENSIONAL VARIATIONS ON ELECTRICAL PROPERTIES OF COAXIAL CABLES,
Naval Applied Science Lab Brooklyn N Y
G. Rodriquez, and T. W. Hardgrave. 3 Dec 63, 15p
Prepared for presentation at Symposium on Technical Progress in Communication Wire and Cable (12th) held at Asbury Park, N. J., 3 Dec 1963.

Descriptors: (*Coaxial cables, Electrical properties), Quality control, Specifications, Test methods, Attenuation, Standing wave ratios.

The paper shows why Military Specification MIL-C-17 now requires continuous monitoring of dielectric diameter, and why it will probably soon require an electrical measurement of reflections at each end of every manufactured length.
AD-656 099 HC$3.00 MF$0.65

RECENT DEVELOPMENT IN SMALL-CORE COAXIAL CABLE,
Standard Telecommunication Labs Ltd Harlow (England)
S. G. Foord. 1963, 22p
Prepared for presentation at Annual Symposium Technical Progress in Communication Wires and Cables (12th) held at Asbury Park, N. J.

Descriptors: (*Coaxial cables, Manufacturing methods), Great Britain, Expanded plastics, Styrene plastics, Molding, Polyethylene plastics, Dielectrics.

Deliberations of the CCITT, leading to the preparation of a standard specification for a 4.4 mm coaxial communication cable have stimulated considerable design activity in the field of small core cables. Two novel solutions are described in this paper, taking as principal requirements the achievement of: (a) low attenuation, (b) constancy of electrical parameters. The first design, which meets the CCITT requirements, has an outer conductor comprising a folded tape with a longitudinal seam, and is separated from the inner conductor by a series of polythene discs within a polythene tube. The latter are produced and applied by a novel process, in which a strip of polythene with contiguous half-discs is continuously extrusion moulded, folded round the centre conductor, and heat sealed. The manufacturing process is described, and the advantages and performance with this type of construction discussed. (Author)
AD-656 100 HC$3.00 MF$0.65

GSE CABLE FACT AND FICTION,
Army Missile Command Redstone Arsenal Ala Ground Support Equipment Lab
W. K. Patterson, and J. M. Porter. 12 Nov 63, 18p
Prepared for presentation at Annual Wire and Cable Symposium (12th), Asbury Park, N. J., Dec 63.

Descriptors: (*Electric cables, *Ground support equipment), Weight, Volume, Mechanical properties, Guided missiles.

A comparison is made between cables used in the early missile system and those used today to show the progress that the cable industry has made over this period of time. Size and weight have been reduced and flexibility improved which has aided in improving missile mobility and reaction time. (Author)
AD-656 101 HC$3.00 MF$0.65

ADHESIVE THERMOPLASTIC COPOLYMERS FOR THE WIRE AND CABLE INDUSTRY,
Dow Chemical Co Midland Mich
For primary bibliographic entry see Field 11A.
AD-656 104 HC$3.00 MF$0.65

POLYPROPYLENE CABLE WRAPS,
Hercules Powder Co Wilmington Del
For primary bibliographic entry see Field 11C.
AD-656 105 HC$3.00 MF$0.65

POLYESTER FILM LAMINATES FOR WIRE INSULATION,
Gore (W L) and Associates Inc Newark Del
For primary bibliographic entry see Field 11I.
AD-656 106 HC$3.00 MF$0.65

THE CHARACTERISTICS OF KYNAR POLYVINYLIDENE FLUORIDE AS AN INSULATING MATERIAL,
Pennsalt Chemicals Corp Philadelphia Pa
For primary bibliographic entry see Field 11I.
AD-656 107 HC$3.00 MF$0.65

INTERMEDIATE AND LOW DENSITY LOW-PRESSURE POLYETHYLENES: THEIR PROPERTIES AND APPLICATIONS IN THE WIRE AND CABLE INDUSTRY,
Du Pont of Canada Ltd Montreal (Quebec) Plastics Dept
For primary bibliographic entry see Field 11I.
AD-656 108 HC$3.00 MF$0.65

ETHYLENE PROPYLENE COPOLYMER PROVIDES A VERSATILE AND STABLE INSULATION,
Enjay Labs Linden N J
For primary bibliographic entry see Field 11I.
AD-656 109 HC$3.00 MF$0.65

CELLULAR POLYPROPYLENE INSULATION,
Hercules Powder Co Wilmington Del
For primary bibliographic entry see Field 11I.
AD-656 110 HC$3.00 MF$0.65

PROPYLENE-BASED COPOLYMERS IN WIRE AND CABLE APPLICATIONS,
Avisun Corp Philadelphia Pa
For primary bibliographic entry see Field 11I.
AD-656 111 HC$3.00 MF$0.65

TERMI-POINT WIRING DEVICES, A NEW APPROACH TO POINT-TO-POINT WIRING,
Amp Inc Harrisburg Pa
Oscar B. Rudolph. Dec 63, 15p
Prepared for presentation at the Annual Wire and Cable Symposium (12th), Fort Monmouth, N. J., Dec 63.

Descriptors: (*Electric connectors, Mechanical fasteners), Electric wire, Electric cables, Performance (Engineering), Small tools, Machines.

The article describes a highly engineered metal clip which actually has a 'wiped' clean contact area, has stored energy, grippes the insulation and which holds the wire with great pressure.
AD-656 112 HC$3.00 MF$0.65

'EUROPA' CABLE,
Societe Anonyme de Telecommunications Paris (France)
Georges Fuchs, and Paul Verges. 1965, 12p
Prepared for presentation at the Annual Symposium on Wire and Cable (14th), December 1, 2 and 3, 1965, Atlantic City, N. J.

Descriptors: (*Coaxial cables, *Electric insulation), France, Polyethylene plastics, Helixes, Tape wound construction, Extrusion, Manufacturing methods, Installation, Communication equipment.

The paper describes a new development of Balloon insulation for large diameter coaxial cables up to 2 inches in size.
AD-656 113 HC$3.00 MF$0.65

A NEW DEVELOPMENT FOR MONITORING PRESSURIZED CABLE PLANT. PART I. SYSTEM AND ECONOMIC ASPECTS,
Radio Corp of America New York Communications Systems Div
J. H. Wolff, E. Cohen, and H. Goldstine. Dec 63, 24p
Prepared for presentation at the USAERDL-Industry Annual Symposium on Communication Wires and Cables (12th), Asbury Park, N. J., Dec 63.

Descriptors: (*Electric cables, Monitors), (*Monitors, Pressurization), Warning systems, Economics.

The paper describes a new system developed to permit all measurements to be made at a remote, attended location.
AD-656 114 HC$3.00 MF$0.65

THE SIGNIFICANCE OF ACCELERATED AGING TESTING OF RUBBER INSULATION,
Anaconda Wire and Cable Co Marion Ind
For primary bibliographic entry see Field 11J.
AD-656 115 HC$3.00 MF$0.65

EVALUATING CHEMICALLY CROSSLINKED POLYETHYLENES,
General Electric Co Bridgeport Conn Wire and Cable Dept
For primary bibliographic entry see Field 11I.
AD-656 116 HC$3.00 MF$0.65

TOUGHER WIRE JACKETS OF NYLON,
Du Pont de Nemours (E I) and Co Wilmington Del Plastics Dept
R. M. Bonner, E. W. Kjellmark, Jr., and R. E. Shaw. 1963, 7p
Prepared for presentation at Symposium (12th) Asbury Park, N. J., 4-6 Dec 1963.

Descriptors: (*Electric wire, *Nylon coatings), Toughness, Extrusion, Quenching (Cooling), Temperature.

Studies of various 610 nylon resins show that the toughness of wire jackets fabricated from these materials can be improved considerably by increasing the temperature of the surface upon which the nylon is extruded and the temperature of the quench water. At the same time, we do not believe that this factor, alone, is any panacea that will guarantee perfect quality wire; certainly many other process factors play an equally important part in producing a tough nylon jacket. Based on our findings, we would encourage the manufacturers of nylon jacketed wire to experiment with the heated wire and/or hot water quench to see if it results in a tougher nylon jacket for their particular construction. (Author)
AD-656 117 HC$3.00 MF$0.65

THE EFFECT OF DIE LAND LENGTH ON THE SURFACE APPEARANCE OF LOW MELT INDEX POLYTHENE EXTRUDATES,
Canadian Industries Ltd New Toronto (Ontario) Plastics Div
For primary bibliographic entry see Field 13H.
AD-656 118 HC$3.00 MF$0.65

HIGH SPEED BAND MARKING OF INSULATED CONDUCTORS,
Hackethal-Draht-Und Kabel-Werke Ag Hanover (West Germany)
Guenther Lehnert. Dec 63, 12p
Prepared for presentation at the Annual Symposium on Technical Progress in Communication

Wires and Cables (12th), Asbury Park, N. J., 4-6 Dec 63.

Descriptors: (*Electric wire, Identification systems), Electric insulation, Colors, Processing.

The need for more versatile equipment to apply color tracers on hot insulation as it emerged from the extruder at the highest speed possible for insulating communication cable conductors prompted the development of the 'Colomat' process. Operational problems and the speed limitations of other high-speed marking processes were overcome by refinements of a unique design. A variety of markings in one or two colors provide for an almost unlimited number of coding combinations to satisfy the most exotic wiring systems or cable assemblies. The 'Colomat' process equipment is available in several models with different marking range potentials. (Author)
AD-656 119 HC$3.00 MF$0.65

A FOAM POLYETHYLENE INSULATED COAXIAL CABLE FOR DIRECT BURIAL ON COMMUNITY TV SYSTEMS,
Northern Electric Co Ltd Montreal (Quebec)
W. R. Beamish. Dec 63, 16p
Prepared for presentation at the Annual Symposium on Technical Progress in Communications Wires and Cables (12th), Asbury Park, N. J., 5 Dec 63.

Descriptors: (*Coaxial cables, *Television communication systems), Underground, Expanded plastics, Polyethylene plastics, Electric insulation, Attenuation, Hermetic seals, Moisture.

The development of economical expanded polyethylene insulated coaxial cables for the distribution of VHF television signals at channel carrier frequencies has stimulated further interest in the problem of controlling variations in attenuation due to moisture absorption and in reducing attenuation to a minimum in small size cables. This paper discusses the use of a longitudinal copper tape outer conductor in which a soldered seam has been used to provide a hermetic moisture seal in a cable of a type used for buried distribution in cable TV systems. A discussion of the effect of moisture on cellular polyethylene is included along with typical data on the extent to which moisture can cause an increase in the attenuation of coaxial cables in moist environments. (Author)
AD-656 120 HC$3.00 MF$0.65

THE CHANGING PATTERN OF TELEPHONE OUTSIDE PLANT,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 17B.
AD-656 162 HC$3.00 MF$0.65

CHEMICALLY CROSS-LINKED POLYETHYLENE. A GENERAL-PURPOSE COMPOUND,
Anaconda Wire and Cable Co Marion Ind
For primary bibliographic entry see Field 11I.
AD-656 163 HC$3.00 MF$0.65

A NEW APPROACH TO COMPOUNDING FOR HIGH TEMPERATURE VINYL WIRE INSULATION,
Thompson Chemical Co Pawtucket R I
For primary bibliographic entry see Field 11I.
AD-656 164 HC$3.00 MF$0.65

IRRADIATED LIGHT WEIGHT MINIATURE COAXIAL CABLES.
Technical rept.,
Raychem Corp Redwood City Calif
V. L. Lanza, R. M. Halperin, and P. W. Wallace.
Nov 61, 15p
Prepared for presentation at the Annual Symposium on Communication Wires and Cables (10th), Asbury Park, N. J., 29 Nov-1 Dec 61.

Descriptors: (*Coaxial cables, Miniature electronic equipment), Radiation damage, Dielectrics, Electric insulation, Coatings, Expanded plastics, Polyethylene plastics, Weight, Mechanical properties, Dielectric properties, Attenuation.

Developments are discussed in the field of miniature coaxial cables which have led to important improvements in the physical and electrical properties of these transmission lines. Primarily, the advantages have been obtained through the use of irradiated foam polyolefin dielectrics having extremely high strength/weight ratios and low dielectric constants. Together with this, the introduction of jacketing materials of irradiated modified polyolefin has provided light weight, high temperature, flame-retarded, flexible insulating coverings. Continuing developments in the field of polymer chemistry and radiation technology promise further improvements in the properties of coaxial cables. (Author)
AD-656 165 HC$3.00 MF$0.65

LONG SPAN INSULATED OPEN WIRE TELEPHONE PLANT,
Rural Electrification Administration Washington D C
For primary bibliographic entry see Field 17B.
AD-656 166 HC$3.00 MF$0.65

A DUAL-INSULATED TERMINATING CABLE,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 17B.
AD-656 167 HC$3.00 MF$0.65

LONGITUDINAL APPLICATION OF INSULATION AND SHIELD ON COMMUNICATION CABLES,
Western Electric Co Inc Chicago Ill
For primary bibliographic entry see Field 17B.
AD-656 168 HC$3.00 MF$0.65

CELLULAR INSULATION FOR COMMUNICATIONS CABLE,
Union Carbide Corp New York Plastics Div
For primary bibliographic entry see Field 11I.
AD-656 169 HC$3.00 MF$0.65

THE INFLUENCE OF EXTRUDER GEOMETRY IN THE PRODUCTION OF HOMOGENEOUS CELLULAR PLASTIC INSULATION,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 13H.
AD-656 170 HC$3.00 MF$0.65

ELECTRICAL FATIGUE AND DIELECTRIC STRENGTH IN TEFLON TFE INSULATION,
Brand-Rex Div Willimantic Conn
For primary bibliographic entry see Field 11I.
AD-656 171 HC$3.00 MF$0.65

FACTORS INFLUENCING ACCELERATED OZONE TESTING AND WEATHERING OF CABLE COMPOSITIONS,
Battelle Memorial Inst Columbus Ohio
For primary bibliographic entry see Field 11C.
AD-656 172 HC$3.00 MF$0.65

SILICONE RUBBER GRADED CONSTRUCTION FOR HIGH VOLTAGE INSULATION,
Dow Corning Corp Midland Mich
S. J. Nizinski. 1961, 7p
Prepared for presentation at the Annual Wire and Cable Symposium (10th), Asbury Park, New Jersey, November 29-December 1, 1961.

Descriptors: (*Electric insulation, Silicone plastics), Voltage, Dielectric properties, Electric cables, Manufacturing methods.

The results obtained show that the electric strength of silicone rubber insulated cable can be increased by using a graded construction, when one layer has a high dielectric constant and the other a low dielectric constant. Silicone rubber is easily adapted to this method because the dielectric constant can be varied from 3 to 7.5 by varying the amount of titanium dioxide added to the silicone rubber base. By making use of silicone rubber's versatility the breakdown voltage was increased by 50%. The amount of increase in breakdown voltage obtained depends upon the variables mentioned in the discussion of the calculated breakdown voltages. The capacitance also increases along with the breakdown voltage. This variation may or may not be important depending upon the application. Two possible applications of graded constructions are ignition cable and gas-tube-sign cable. (Author)
AD-656 174 HC$3.00 MF$0.65

STANDARDIZATION OF WIRE TERMINATIONS USED ON MILITARY EQUIPMENT,
American Machine and Foundry Co Alexandria Va Alexandria Div
Robert O. Beach. 1966, 16p

Descriptors: (*Electric terminals, Standardization), Specifications, Standards, Military requirements, Army equipment.

The result of this analysis and test work was the preparation of a series of specifications and standards. The documentation prepared, the 9 general specifications, 207 detailed specifications and 76 standards, provide complete coverage of the technical areas. Government supply and engineering activities are thus provided with specific and detailed information on terminations. The variety of items in the military supply system can be limited to a reasonable extent, a standard of quality is established to promote reliable performance, and the items can be identified in a positive manner.
AD-656 175 HC$3.00 MF$0.65

WIRES AND CABLES FOR SUBMARINE RADIO SYSTEMS.
Technical paper,
Navy Underwater Sound Lab New London Conn
K. L. Blaisdell. 1961, 7p
Annual Wire and Cable Symposium (10th), Asbury Park, N. J., 29-30 November and 1 December 1961.

Descriptors: (*Radio equipment, Underwater), (*Electric cables, *Submarines), Moistureproofing, Military requirements, Plastic coatings, Electric insulation, Coaxial cables.

The modern submarine needs modern radio communications, and this requires wires and cables meeting the unique requirements of the submarine environment. Cables and wires which were satisfactory in former days are no longer acceptable. The Underwater Sound Laboratory is developing improved cables for submarine radio systems.
AD-656 176 HC$3.00 MF$0.65

A NEW ATTENUATING CONDUCTOR FOR REDUCING RADIO FREQUENCY NOISE FOUND ON ORDINARY POWER DISTRIBUTION LINES,
Naval Civil Engineering Lab Port Hueneme Calif
Don B. Clark, and James L. Brooks. 15 Sep 61, 8p

Descriptors: (*Transmission lines, *Electromagnetic shielding), Radiofrequency interference, Tape wound construction, Attenuation, Tapes, Metals, Vinyl plastics, Electric cables, Effectiveness, Costs.

The technique of wrapping power conductors with high permeability tape shows promise of surpassing, both in cost and effectiveness the present tech-

nique of burying the lines for the purpose of reducing r.f. interference. (Author)
AD-656 177 HC$3.00 MF$0.65

UNDERWATER CABLE CONNECTORS AND TERMINATORS FOR HYDROSTATIC PRESSURES TO 10,000 PSI,
Joy Mfg Co New Philadelphia Ohio Electrical Products Div
G. C. Thym, and R. A. Swan. Nov 61, 7p
Prepared for presentation at the Annual Wire and Cable Symposium (10th), Asbury Park, N. J., Nov 61.

Descriptors: (*Electric connectors, Underwater equipment), Hydrostatic pressure, Electric terminals, High-pressure research, Moistureproofing, Bonding, Rubber seals.

Pressure tight connections have proven quite successful for underwater circuitry at pressures up to 10,000 PSI and occasional applications to 20,000 PSI. Construction of portable connectors for pressures to 5000 PSI is simple, as long as they are free of voids; while above this pressure, reinforcement of metallic components is necessary. Receptacles require internal reinforcement above 1000 PSI and complete redesign is required above 3000 PSI. Rubber to metal bonding techniques using the best commercially available currents are necessary to prevent small leaks and objectionable rubber displacement. (Author)
AD-656 178 HC$3.00 MF$0.65

'QUINA': A SUBMARINE CABLE FOR AUDIO AND CARRIER FREQUENCIES,
Pirelli Spa Milan (Italy)
For primary bibliographic entry see Field 17B.
AD-656 179 HC$3.00 MF$0.65

DEVELOPMENT OF LIGHTWEIGHT GROUND SUPPORT CABLES FOR QUICK REACTION MISSILE SYSTEMS,
Martin Co Baltimore Md
W. Rigling. Nov 61, 18p

Descriptors: (*Electric cables, Ground support equipment), Weight, Volume, Electric insulation, Coatings, Wire, Steel, Copper.

A program was undertaken to drastically reduce the size and weight of missile support cables while still meeting the mechanical test requirements of MIL-C-13777. This was accomplished through first individual testing of each cable element (conductor, primary insulation, sheath) through testing completed cables. (Author)
AD-656 180 Not available from CFSTI.

CORRUGATED METALLIC SHEATH FOR COMMUNICATION AND DATA TRANSMISSION CABLES,
Simplex Wire and Cable Co Cambridge Mass
K. P. Roberts, and P. H. Ware. 1961, 10p
Annual Wire and Cable Symposium (10th) Asbury Park, N. J., 1 Dec 1961.

Descriptors: (*Electric cables, *Metal coatings), Transmission lines, Data transmission systems, Communication equipment, Bending, Deformation, Electrical properties, Welding, Electromagnetic shielding.

The use of welded corrugated metallic sheath for communication and data transmission cables offers several advantages, some of which, but not all, are shared by conventional sheath systems. It is mechanically rugged, and offers excellent protection against crushing, impact, tension, and other physical damage. The specific mechanical properties can be varied over a wide range of suitable choice of metal, thickness, and design of corrugations. It is pliable, and can be handled by conventional methods. It is watertight and, with suitable terminations, vaportight, permitting pressurization. It offers complete electrostatic shielding and good electromagnetic shielding. In addition it offers protection against induced voltages due to lightning. (Author)
AD-656 181 HC$3.00 MF$0.65

AN APPROACH TO OPTIMIZATION OF MISSILE CABLE SYSTEM DESIGN,
Frankford Arsenal Philadelphia Pa
William Gilmour, and Bernard Kirshtein. Nov 61, 11p

Descriptors: (*Electric cables, Guided missiles), Optimization, Batteries + components, Design, Reliability.
Identifiers: Hawk.

In respect to the designs of missile cable systems, it can be shown by past cases that the proper emphasis has not been placed at the proper time to even effect on acceptable compromise of all design conditions. It is understood that reliability is the foremost factor in the design of any cable system. However, reliability can be achieved without sacrifice and still ameliorate the other design and standardization parameters. This paper is presented based upon an actual case history associated with the design of the cable system for the Hawk Battery.
AD-656 182 HC$3.00 MF$0.65

CHECKOUT CABLES FOR AN AIR-TO-SURFACE MISSILE,
North American Aviation Inc Downey Calif
Space and Information Systems Div
F. Kent Gill. 1961, 17p
Prepared for presentation at Symposium on Communications Wires and Cables (10th) Asbury Park, N. J., 29-30 Nov, 1 Dec 1961.

Descriptors: (*Electric cables, *Checkout equipment), Guided missiles (Air-to-surface), Design, Electric connectors, Installation.
Identifiers: Hound Dog.

The cables required for an air launched missile are as numerous and complex as the cables required for a large air-to-surface missile. Approximately 250 differently designed cables are required to support the Hound Dog Missile. Design criteria for these cables were established to provide a quality product at a reasonable cost through standardization of hardware and components. The nature of the checkout of the missile precluded the use of cable procured to MIL-C-13777 without deviating to the specification. Major procurement problems on this program were delivery, quality control and design changes. (Author)
AD-656 183 HC$3.00 MF$0.65

CABLE SPLICING UTILIZING NEW SILICONE MATERIALS,
Dow Chemical Co Midland Mich
For primary bibliographic entry see Field 13H.
AD-656 186 HC$3.00 MF$0.65

NEW FLUOROCARBON INSULATION COMPOUNDS,
Gore (W L) and Associates Inc Newark Del
For primary bibliographic entry see Field 11I.
AD-656 187 HC$3.00 MF$0.65

THE APPLICATION OF ELECTRICAL CABLE TO MISSILE SYSTEMS,
Douglas Aircraft Co Inc Santa Monica Calif
G. H. Morgan. 1960, 11p
Annual Wire and Cable Symposium (9th), Asbury Park, N. J., 30 Nov-2 Dec 1960.

Descriptors: (*Guided missiles, *Electric cables), Military requirements, Plastic coatings, Hazards, Design, Standardization, Lunar environment, Reliability.

Electrical cables are a vital part of any missile system. They are used to carry the signals that control, monitor, test and fire the missile. The reliability of the whole system is dependent on the reliability that is achieved in these interconnecting cables. The cable manufacturer can build reliable cable but unless the system designer selects the proper cable to fit the application, this reliability may not be attained. This problem is discussed in the report.
AD-656 189 HC$3.00 MF$0.65

UNARMOURED SUBMARINE CABLE FOR DEEP-SEA CARRIER TELEPHONY,
Submarine Cables Ltd London (England)
For primary bibliographic entry see Field 17B.
AD-656 192 HC$3.00 MF$0.65

A NEW ANTITWIST ARMOURED SUBMARINE CABLE,
Pirelli Spa Milan (Italy)
For primary bibliographic entry see Field 17B.
AD-656 193 HC$3.00 MF$0.65

CONSTRUCTION DETAILS AND PROCESSING METHODS OF GEOPHYSICAL CABLES,
Vector Cable Co Houston Tex
C. P. McKenna. 1960, 19p
Annual Wire and Cable Symposium (9th) Asbury Park, N. J., 30 Nov. 1-2 Dec 1960.

Descriptors: (*Electric cables, Geophysical prospecting), Design, Electric connectors, Buoyancy, Processing.

Topics included are: land cables, velocity cables, marine floating cables, and processing methods.
AD-656 194 HC$3.00 MF$0.65

NEW LOW-LOSS 'BALLOON' TYPE POLYETHYLENE INSULATION FOR TELECOMMUNICATION CABLES,
Societe Anonyme de Telecommunications Paris (France)
For primary bibliographic entry see Field 11G.
AD-656 195 HC$3.00 MF$0.65

HIGH DENSITY POLYETHYLENE INSULATION IN COMMUNICATION CABLES,
Plastic Wire and Cable Corp Jewett City Conn
J. Vincent McBride. Dec 60, 9p
Annual Wire and Cable Symposium (9th), Asbury Park, N. J., Dec 60.

Descriptors: (*Polyethylene plastics, Electric insulation), Electric cables, Plastic coatings, Transmission lines, Telephone lines, Toughness, Costs, Performance (Engineering).

The acceptance and use of a material depends upon its cost and the ease with which it may be processed as well as upon its performance. Even with the present cost of High Density a little higher than that of High Molecular Weight Polyethylenes, it is likely that in Communication Cables as primary insulation, and to some extent in special jacket applications, the High Density Polyethylene may find increasing application due to its extra mechanical safety factors. However, if increased availability should result in little or no cost differential it is possible that the High Density Polyethylene may become the most generally used in these applications. (Author)
AD-656 197 HC$3.00 MF$0.65

COAXIAL CABLE AND SHIELDED WIRE TERMINATIONS,
Amp Inc Harrisburg Pa
M. L. Brown. 1 Dec 60, 21p
Annual Wire and Cable Symposium (9th), Asbury Park, N. J., 1 Dec 60.

Descriptors: (*Coaxial cables, *Electric terminals), (*Electric connectors, Coaxial cables), Electric wire, Shielding, Manufacturing methods, Reviews, Crimping tools, Performance (Engineering).

Extended use of higher and higher frequencies and the need for background noise reduction indicate a vastly expanded need for Coax Cable and Shielded Wire. This presentation will indicate some of the current techniques and latest methods of terminating this type of Cable and Wire. In all cases, an AMP solderless connection is produced by fast-acting, cycle-controlled tools (either hand or machine) which provide measurable quality control and high performance. All AMP Coax Cable terminations also feature simultaneous center conductor and braid crimps with one stroke of the tool, resulting in the very lowest installed cost for this type of termination. In view of continuously rising labor costs the cost to install many conventional types of Coax terminations often exceeds the cost of the termination itself. Products are grouped and discussed separately in this report.
AD-656 200 HC$3.00 MF$0.65

WIRE JACKETS OF NYLON R=K(PQ)+(EC) TO THE X POWER
Du Pont de Nemours (E I) and Co Wilmington Del Polychemicals Dept
For primary bibliographic entry see Field 11C.
AD-656 203 HC$3.00 MF$0.65

THE POWER RATING OF TEFLON COAXIAL CABLES AT EXTREME ENVIRONMENTS,
Martin Co Denver Colo
E. T. Pfund, Jr., and P. S. Klasky. 1967, 55p
Contract AF 04 (645)-56
Prepared in cooperation with Technicraft, Thomaston, Conn., and United Electrodynamics, Inc., Pasadena, Calif.
Availability: Microfiche only after original copies exhausted.

Descriptors: (*Coaxial cables, *Halocarbon plastics), Radiofrequency power, High-temperature research, Low-temperature research, Standing wave ratios, Environmental tests, Electric connectors, Performance (Engineering), Life expectancy.

Due to the unique construction of RG-115A/U, a more temperature stable cable is obtained. Short term applications to 800F are possible due to the taped construction allowing for Teflon expansion. At 600F, RG-117/U becomes difficult to work with because of the longitudinal thermal expansion of the Teflon dielectric. However, it probably can carry more power at that temperature than any other braided cable that is commercially available. Connectors employed with coaxial cables at the high powers and environments concerned here must of necessity be of the solderless type due to inner conductor heating. For life-index purposes, the present conservative power derating factor of 1/VSWR seems to be rather high, especially for VSWR's as low as 2:1. System VSWR's of the latter magnitude may not materially contribute to short term life-index power ratings. (Author)
AD-656 204 MF$0.65

SIMULTANEOUS EXTRUSION OF POLYETHYLENE AND POLYVINYL CHLORIDE COATINGS ON ELECTRICAL CONDUCTORS,
Western Electric Co Inc Baltimore Md
For primary bibliographic entry see Field 13H.
AD-656 205 HC$3.00 MF$0.65

A PRESENT AND FUTURE VIEW OF THE FIELD ARMY WIRE AND CABLE REQUIREMENTS,
Army Signal Center and School Fort Monmouth N J
For primary bibliographic entry see Field 17B.
AD-656 206 HC$3.00 MF$0.65

FOUR-WIRE FIELD WIRE,
Army Electronics Labs Fort Monmouth N J
For primary bibliographic entry see Field 17B.
AD-656 207 HC$3.00 MF$0.65

DEVELOPMENTS IN 300-600 VOLT MINIATURE FLEXIBLE INSULATED LEAD WIRE FOR USE AT 700-2000F,
Rockbestos Wire and Cable Co New Haven Conn
Welton D. Parker. 1960, 9p
Annual Wire and Cable Symposium, Asbury Park, N. J., November 30, December 1, 2, 1960.

Descriptors: (*Electric wire, Miniature electronic equipment), (*Electric insulation, High-temperature research), Electrical properties, Mechanical properties, Fibers, Inorganic compounds, Impregnation, Glass textiles, Mica, Heat-resistant materials.

At the present state of the art, many applications require compromises between the more critical features of the requirements and such balance or combination of performance characteristics as can be built into the wire. Continuing developmental activities include consideration of new conductor materials, inorganic matrices and impregnants, impervious flexible and rigid outer coverings and compatible terminations. Higher and higher temperatures, lower weights and smaller diameters continue to characterize requirements of users, and so identify for any given interval of time the dynamic goals of the manufacturer of high temperature wire. (Author)
AD-656 215 HC$3.00 MF$0.65

RIBBON CABLES FOR USE AT HIGH TEMPERATURE,
Gore (W L) and Associates Inc Newark Del
W. L. Gore. 1959, 11p
Wire and Cable Symposium (8th), Asbury Park, N. J. 1 Dec 1959.

Descriptors: (*Electric cables, High-temperature research), Slender bodies, Mechanical properties, Halocarbon plastics, Heat transfer.

Ribbon type cables are now available insulated with strain-free PTFE. These cables are produced with essentially any size or type of conductor and almost any combination of leads (e.g. mixed sizes, thickness of insulation, coax, twisted pairs, shielded and unshielded, etc.) can be supplied in the same ribbon cable. These cables remain tough and flexible at extremely low temperatures, and with suitable conductors they can be used continuously at above 300C. Spacing of the conductors can be manipulated to give required electrical characteristics. The order sequence of leads across the ribbon offers a new dimension in lead identification that greatly increases the identification capacity of these cables. Important savings in space and weight are possible with these new ribbon cables. (Author)
AD-656 225 HC$3.00 MF$0.65

AN EVALUATION OF HEAT STABILIZED, FLAME-RETARDED, CROSS-LINKED POLYOLEFINS FOR ELECTRONIC WIRE AND CABLE APPLICATIONS.
Raychem Corp Redwood City Calif
For primary bibliographic entry see Field 11I.
AD-656 226 HC$3.00 MF$0.65

DEVELOPMENT OF SEMI-AIR SPACE COAXIAL CABLES FOR 300 AND 500C,
Phelps Dodge Copper Products Corp Yonkers N Y
S. W. Trill, and A. L. McKean. 1959, 29p
Prepared for presentation at the Annual Symposium Communication Wire and Cable (8th), December 1, 2, and 3, 1959, Asbury Park, N. J.

Descriptors: (*Coaxial cables, High-temperature research), Dielectrics, Halocarbon plastics, Refractory materials, Quartz, Pipes, Laminates, Electric connectors, Radiation damage, Performance (Engineering).

Coaxial cables of semi-air space design were developed for 300C and 500C service, and their excellent performance characteristics and stability demonstrated. Filled Teflon, at 300C, and Refrasil or Quartz, at 500C perform satisfactorily as dielectrics. A laminate tube construction was developed for use as the outer conductor (sheath) at high temperatures. Advantages gained include tougher plating protection, and a minimum metal losses. The new cables are practical to manufacture in lengths up to 100 ft. or more, and can be supplied either with smooth or corrugated outer conductor. The constructions provide communication capabilities in high temperature environments; alternatively, at low ambients they can satisfy high power requirements. Cable fittings of optimum electrical design were developed to provide a sealed system. Pressurizing may be used to augment voltage and power handling capabilities. Cable performance in a nuclear field was shown to be essentially unaffected by the ionizing radiation of the air dielectric. (Author)
AD-656 227 HC$3.00 MF$0.65

NYLON 6 AS A WIRE JACKETING MATERIAL,
Spencer Chemical Co Henderson Ky Nylon Technical Dept
For primary bibliographic entry see Field 11C.
AD-656 228 HC$3.00 MF$0.65

EXPERIMENTAL RESULTS OF CELLULAR DIELECTRICS FOR TELECOMMUNICATION CABLES,
Pirelli Spa Milan (Italy)
Riccardo Monelli. 1959, 11p
Annual Wire and Cable Symposium (8th), Asbury Park, N. J., December 1, 2, 3, 1959.

Descriptors: (*Dielectrics, *Expanded plastics), Italy, Coaxial cables, Telephone lines, Electric insulation, Polyethylene plastics, Capacitance, Thickness, Stresses.

The use of c.p. as telephone wire insulation seems advisable provided that the insulation thickness is higher than 0.24 in. and the ratio 'insulation diameter/conductor diameter' higher than 2. From this limitation derives that a good field of application seems to be that of the trunk cables. Satisfactory results are obtained in the manufacture of small coaxials for telephone systems with transistor repeaters. For the extrusion control the capacitance monitor with tubolar air probe has proved to be useful and convenient. Stress cracking in too high melt index compound is well shown by soapy water tests. The first tests seem to suggest that with low pressure polyethylene a better dispersion on the cells and consequently a greater expansion and a lower permittivity can be obtained. (Author)
AD-656 229 HC$3.00 MF$0.65

THERMAL AGING CHARACTERISTICS OF AIRCRAFT WIRES AND CABLES,
Naval Research Lab Washington D C
E. L. Brancato, and F. J. Campbell. 1959, 18p
Preapred for presentation at the Annual Wire and Cable Symposium (8th), Asbury Park, N. J., December 1, 2, and 3 1959.

Descriptors: (*Electric wire, Aging (Materials)), (*Electric cables, Aging (Materials)), Life expectancy, Degradation, Stresses, Test methods, Thermal properties, Aircraft.

A functional evaluation program was established which will provide a comparison of thermal service life of wire and cable insulation by combining the

effects of heat aging with the most predominant service stresses. The stresses are necessarily of greater severity than normal service and thus provide relative life data rather than absolute values of service life. Experimental data of life versus aging temperature when statistically treated and the log of life versus the reciprocal of the absolute temperature plotted on semi-log paper approximates a straight line which can be represented by the Chemical Rate Equation. Temperature cycling studies conducted on a representative magnet wire insulation system indicate that reasonable estimates of service life under varying temperature conditions can be obtained by applying the relative aging factor principle. From the life versus temperature curve a relative aging factor can be derived which can be applied to convert aging time at any given temperature to a relative amount of normal life consumed at a reference temperature. When the high temperature exposures occur in known service cycles, it is possible to calculate the number of cycles of safe operation which can be expected of the cable. (Author)
AD-656 230 HC$3.00 MF$0.65

USE AND ABUSE OF PLASTIC INSULATION AND JACKETS,
Hydro-Electric Power Commission of Ontario (Canada)
B. Kellam. 1959, 24p
Prepared for presentation at the Annual Wire and Cable Symposium (8th), Asbury Park, N. J., December 3, 1959.

Descriptors: (*Plastic coatings, Electric insulation), (*Electric cables, Plastic coatings), Polyethylene plastics, Polyvinyl chloride, Tape wound construction, Electric wire, Joining, Thermoplastics, Failure (Electronics), Creep.

Experiences in the use of two thermoplastics for insulation and jacketing of electrical conductors indicate that a knowledge of material limitations is necessary and useful in preventing misapplication. It also assists in the determination of causes of premature failure of an electrical circuit. It permits the use of such materials in certain situations not normally suitable, by designing around the limitations. The development of low-voltage cable-joining procedures falls into two types: one wherein the material cost is low but which requires skill to apply, and the other wherein the materials are expensive but require little or no skill. Each has its advocates depending on the availability of skilled workmen. In comparison with thermosetting materials or vulcanized elastomers, thermoplastics have a greater tendency to creep with temperature and stress. This should be recognized in their application to insulating and covering electrical conductors. Attention paid to the installation and mounting of such conductors to reduce the weight per unit area, to proper current rating and setting of limiter devices, will be rewarded with a long and useful service life.
AD-656 231 HC$3.00 MF$0.65

A THEORETICAL CONSIDERATION OF STIFFNESS IN AN ELECTRICAL CABLE,
RCA Service Co Alexandria Va
E. W. MacLaren, Jr., and V. L. Carney. 1959, 16p
Annual Wire and Cable Symposium (8th), Asbury Park, N. J., Dec 3, 1959.

Descriptors: (*Electric cables, Mechanical properties), (*Guided missiles, Electric cables), Design, Predictions, Temperature, Materials, Military requirements, Equations, Performance (Engineering).

The study was planned to yield results useful to designers as well as manufacturers and users. The specific purposes of the study were: (1) To provide an analytical method of predicting overall cable rigidity. (2) To provide a method of forecasting the effects of temperature change on cable rigidity. (3) To provide a means of determining relative rigidity of any of several materials to be considered for use in a specific cable component. (4) To outline a method for the determination of relative rigidity of different combinations of conductor configuration and wire size. (5) To make available a tool for determining, from the viewpoint of rigidity, an optimum overall mechanical design. (6) To provide an analytical basis for predetermining acceptable component design in meeting the flexibility specifications for military application. (Author)
AD-656 232 HC$3.00 MF$0.65

NEW INSULATION APPLICATIONS OF HIGH-DENSITY POLYETHYLENE AND POLYPROPYLENE,
Hercules Powder Co Wilmington Del
For primary bibliographic entry see Field 11I.
AD-656 234 HC$3.00 MF$0.65

ETHYLENE COPOLYMERS FOR WIRE COATING,
Phillips Chemical Co Bartlesville Okla Plastics Sales Div
For primary bibliographic entry see Field 11I.
AD-656 235 HC$3.00 MF$0.65

A NOVEL METHOD OF CORE SCREENING POLYETHLENE INSULATED CABLES,
Standard Steel Works Inc Kansas City Mo
R. S. Stevens, and A. Tomica. Oct 59, 8p

Descriptors: (*Electric cables, Coatings), Electric insulation, Polyethylene plastics, Electrical conductance, Ionization, Bonding, Defects (Materials), Manufacturing methods.

A new method of forming a conducting layer on polyethylene has been developed to provide a screen for high voltage plastic insulated cables, which will avoid the risk of ionisation at the insulation boundaries. The possible application to communication cables has not so far been considered, but it seems possible that it will have advantages where high voltage or low noise requirements obtain. (Author)
AD-656 237 HC$3.00 MF$0.65

THE DESIGN OF DIES FOR HIGH-SPEED WIRE COATING,
Tennessee Eastman Co Kingsport
For primary bibliographic entry see Field 13I.
AD-656 238 HC$3.00 MF$0.65

THE PROBLEM OF DRYING POLYETHYLENE SHEATHING COMPOUND PRIOR TO EXTRUSION,
Western Electric Co Inc Chicago Ill
For primary bibliographic entry see Field 13H.
AD-656 240 HC$3.00 MF$0.65

DESIGN AND APPLICATION OF MISSILE CABLES EMPLOYING LAYTEX INSULATION,
Kaiser Aluminum and Chemical Corp Bristol R I Bristol Works
W. K. Priestley, E. J. D'Aquanno, and C. J. Tappero. 1959, 23p
Annual Wire and Cable Symposium (8th), Asbury Park, N. J., December 1, 2, and 3, 1959.

Descriptors: (*Electric cables, Ground support equipment), (*Rubber coatings, Electric cables), Guided missiles, Electric insulation, Design, Performance (Engineering).

Topics included are: Development of latex insulating compounds; Development of latex coverings; Application of latex compounds; Characteristics of laytex insulation; Cable applications.
AD-656 241 HC$3.00 MF$0.65

CROSSTALK IN TACTICAL INTRA-AREA GROUND ELECTRONIC CABLES,
RCA Service Co Alexandria Va
D. Botticello, and K. Okamoto. 3 Dec 59, 19p
Prepared for presentation at the Annual Wire and Cable Symposium (8th), Asbury Park, N. J., December 3, 1959.

Descriptors: (*Electric cables, Interference), Capacitance, Predictions, Nomographs.

A method of predicting crosstalk in a two layer cable was discussed. The empirical data from laboratory test samples indicates that the method may be applied to any two layer cable where the conductors do not vary in size by more than two AWG numbers. Capacitance between conductors is the most important cable constant to be considered when dealing with electrostatic crosstalk and unbalanced circuit arrangements. The load on the disturbed pair and the frequency of the disturbing signal are the other considerations. A group of crosstalk characteristic curves when plotted from an equation derived empirically can be used to predict crosstalk amplitude. Capacitance between conductors of a two layer cable can be predicted from a nomogram which relates primary conductor material to capacitance. (Author)
AD-656 242 HC$3.00 MF$0.65

CABLE SHEATHS AND WATER PERMEABILITY,
Collyer Insulated Wire Co Lincoln R I
Gordon F. Todd. 1959, 17p
Annual Wire and Cable Symposium (8th), Asbury Park, N. J., December 1959.

Descriptors: (*Moistureproofing, *Electric cables), Electric wire, Performance (Engineering), Rubber, Water, Absorption (Physical).

The degree to which a cable sheath material can protect the interior of a cable from moisture may be determined by simple water permeability tests. Water permeability tests are more reliable for this purpose than water absorption tests, and agree quite well with elaborate cable soaking tests carried out for many months at elevated temperature. Extensive cable immersion data relating 22 materials are given. No rubber or plastic material was found to possess total water barrier capability.
AD-656 243 HC$3.00 MF$0.65

DETERMINATION OF THE COEFFICIENT OF LINEAR EXPANSION WITH TEMPERATURE OF CABLE STRUCTURES,
Bell Telephone Labs Inc Murray Hill N J
K. J. Dahms, and J. H. Shuhart. 1967, 16p

Descriptors: (*Electric cables, Thermal expansion), Determination, Deformation, Aluminum.

Bowing of aerial cable and its attendant phenomenon, fatigue failure of the metallic sheath of that cable, have been problems since the first lead-sheathed cable was supported by rings from a steel strand. The object of the project was to determine the coefficients of linear expansion of cable structures in order to formulate one tool to be used in two different attacks on the problem of bowing of metallic-sheathed cables: the first consisting of new construction methods to prevent bowing; the second consisting of methods of treating old cable in which the bows had led to an unreasonably high trouble rate.
AD-656 244 HC$3.00 MF$0.65

SCOPE OF I.P.C.E.A. STANDARDS FOR POLYETHYLENE INSULATED THERMOPLASTIC JACKETED COMMUNICATION cables,
Insulated Power Cable Engineers Association Montclair N J
J. Vincent McBride. 1959, 9p
Annual Wire and Cable Symposium (8th), Asbury Park, N. J., Dec 1959.

Descriptors: (*Electric cables, Standards), Communication equipment, Polyethylene plastics, Electric insulation, Thermoplastics, Physical properties.

In July, 1959, the Insulated Power Cable Engineers Association, generally known by the initials I.P.C.E.A., issued the first edition of I.P.C.E.A. publication number S-56-434 titled 'Standards for Polyethylene Insulated, Thermoplastic Jacketed Communication Cables'. It covered aerial and duct cables and direct burial cables, each in a fully color coded Type I and a non color coded Type II construction. Complete Test Procedures were included as a part of the I.P.C.E.A. standards.
AD-656 245 HC$3.00 MF$0.65

COLOR STANDARDS FOR PLASTIC INSULATED COMMUNICATION CABLES AND WIRES,
Rural Electrification Administration Washington D C
For primary bibliographic entry see Field 17B.
AD-656 246 HC$3.00 MF$0.65

PLASTIC INSULATED RIBBON CABLE FOR SWITCHBOARD WIRING,
Bell Telephone Mfg Co Antwerp (Belgium)
For primary bibliographic entry see Field 17B.
AD-656 248 HC$3.00 MF$0.65

SPECIFICATION CHANGES AND NEW DEVELOPMENTS IN CABLE AND WIRE FOR THE RURAL ELECTRIFICATION ADMINISTRATION,
Rural Electrification Administration Washington D C
For primary bibliographic entry see Field 17B.
AD-656 251 HC$3.00 MF$0.65

THE ROLE OF WIRE AND CABLE IN MILITARY COMMUNICATIONS,
Signal Corps Engineering Labs Fort Monmouth N J
Howard L. Kitts, and Howard F. X. Kingsley.
1954, 10p
Annual Wire and Cable Symposium, Asbury Park, N. J., December 7, 8, 9 1954.

Descriptors: (*Transmission lines, Military requirements), Communication systems, Electric wire, Electric cables, Electric connectors, Field wire.

A completely integrated system of wire and radio facilities is a 'must' and extensive use of radio relay in the system is envisioned, but wire communication is still the backbone and workhorse of the system. There are very definite limitations on the number of usable radio channels in any given area -- but not to the amount of wire and cable that may be installed. Radio traffic can be intercepted by the enemy and transmitting sites very definitely located. The requirements for wire transmission facilities -- both local and long-haul types is increasing -- not diminishing.
AD-656 252 HC$3.00 MF$0.65

BUTYL INSULATION,
Esso Research and Engineering Co Linden N J
For primary bibliographic entry see Field 11I.
AD-656 253 HC$3.00 MF$0.65

MANUFACTURE OF ALUMINUM CONDUCTOR TELEPHONE CABLE,
Western Electric Co Inc Kearny N J
For primary bibliographic entry see Field 17B.
AD-656 254 HC$3.00 MF$0.65

SUBMARINE CABLE SYSTEM FOR THE FLORIDA MISSILE TEST RANGE,
Air Force Missile Test Center Patrick AFB Fla
Free Calhoun. 1954, 7p
Prepared for presentation at the Annual Wire and Cable Symposium (3rd), Asbury Park, N. J. December 7-9, 1954.

Descriptors: (*Coaxial cables, Underwater), Florida, Guided missile ranges, Electric cables, Installation, Reliability, Costs.

Topics included are: system description, cable structure, cable laying, transmission, service status, and cost data.
AD-656 256 HC$3.00 MF$0.65

MECHANICAL SPLICE CLOSURES FOR TELEPHONE CABLES,
Bell Telephone Labs Inc Murray Hill N J
P. P. Koliss. Dec 54, 6p
Prepared for presentation at the Annual Wire and Cable Symposium (3rd), Coles Signal Lab., Fort Monmouth, N. J., 7 Dec 54.

Descriptors: (*Telephone lines, Electric terminals), (*Electric terminals, Rubber seals), Aluminum, Castings, Seals, Joining, Electric cables, Weatherproofing.

During the post-war shortage of lead, new alpeth and stalpeth cable, sheathed in polyethylene, have proved excellent substitutes for traditional lead-sheathed cable in meeting urgent demands for new voiceways. But their use has been limited by the difficulty in closing a sheath that cannot be soldered and sealed by the long-established techniques used with lead sheath. This article tells how this difficulty was overcome by using an entirely new procedure, in which a die cast aluminum casing is conveniently bolted to the cable and sealed gas-tight with a special compound. (Author)
AD-656 258 HC$3.00 MF$0.65

A REPORT ON WORK NOW BEING DONE TO IMPROVE ELECTRICAL CONNECTOR RELIABILITY,
Whitney Blake Co New Haven Conn
E. C. Quackenbush. 1954, 5p
Prepared for presentation at Annual Symposium on Technical Progress in Communication Wires and Cables (3rd) Asbury Park, N. J., 7-9 Dec 1964.

Descriptors: (*Electric connectors, Reliability), Design, Standardization, Electric terminals, Molding.

Topics included are: interchangeability, contact reliability, terminals, integral lead details, assemblies, shells and assembly, shell design, and cable clamps.
AD-656 259 HC$3.00 MF$0.65

IRRATHENE 201 IRRADIATED POLYETHYLENE: A NEW CABLE INSULATION,
General Electric Co Pittsfield Mass
For primary bibliographic entry see Field 11I.
AD-656 261 HC$3.00 MF$0.65

THE NATURAL AND ARTIFICIAL AGING OF WIRE JACKETS,
Battelle Memorial Inst Columbus Ohio
For primary bibliographic entry see Field 11C.
AD-656 262 HC$3.00 MF$0.65

A RESIN-SEALED APPROACH TO COMMUNICATIONS SPLICING,
Minnesota Mining and Mfg Co St Paul
E. W. Bollmeier. 1954, 17p
Prepared for presentation at the Annual Signal Corps Symposium 'Technical Progress in Communication Wires and Cables', Asbury Park, N. J., 1954.

Descriptors: (*Transmission lines, Joining), (*Epoxy plastics, Seals), Joints, Effectiveness, Communication equipment.

Splices are discussed which offer sufficient advantages for serious consideration. In effect, they combine the better properties of mechanical closures and liquid epoxy resin into an approach impossible with either alone. In the case of the openable, reopenable and solid splices, the advantages of convenience, uniformity, appearance and abuse resistance are obtained through use of a mechanical housing. Beyond these advantages are those of the epoxy self-hardening resin which saturate, seal and unite cable to housing in a way impossible to accomplish mechanically. It is difficult to assess the relative merits of the openable and reopenable splices. Each has sufficient advantage to warrant application to existing problems. Some cable installations need rarely be disturbed, thus recommending use of the openable splice. Others may require frequent access if only for testing, thereby making the reopenable splice most economical. The reopenable splice offers the greater future adaptation to problems improved, yet lower cost cable installations, in the author's opinion. What is now the cover on the reopenable splice may become a terminal box, a loading coil or possibly a chamber to house a miniature repeater. The reopenable splice may be regarded as a base upon which a variety of miniature equipment may be built into the cable. (Author)
AD-656 263 HC$3.00 MF$0.65

BALANCED RADIO FREQUENCY CABLES,
American Phenolic Corp Chicago Ill
C. C. Camillo, G. F. Kovar, and R. M. Soria.
1954, 40p
Annual Wire and Cable Symposium, Asbury Park, N. J., 7-9 Dec 1954.

Descriptors: (*Coaxial cables, Wave transmission), Attenuation, Electrical impedance, Propagation, Performance (Engineering).

The results of this investigation of twin and dual coaxial cables show that the chief causes of transmission unbalance are: (1) Eccentricity of the twisted pair within the core and shield braid in twin cables, (2) Uneven twisting of the conductors in twin cables and of coaxial cables in dual cables, (3) Variation in the length of conductors or separate coaxial cables. Two equations have been derived. One correlates transmission unbalance to the measured capacitance unbalance. The second equation relates transmission unbalance to conductor length differences or capacitance unbalance. As a result of the production of the improved RG-22A/U and the new dual coaxial cables, it was found that values of transmission unbalance of 3% at 100 megacycles can be attained. It is apparent that the target value of 2-1/2% transmission unbalance for RG-22A/U has been very nearly achieved. However, in view of the findings of this development, it is felt that the 1% value at 100 megacycles specified for the dual coaxial cable was set too low initially. It is felt that with measuring and manufacturing techniques at their present level, dual coaxial cables can be fabricated with transmission unbalance values as low as 3% up to frequencies of 100 megacycles. (Author)
AD-656 264 HC$3.00 MF$0.65

SELF-SUPPORTING COMMUNICATION CABLES USING COPPERWELD CONDUCTORS,
Copperweld Steel Co Glassport Pa
For primary bibliographic entry see Field 17B.
AD-656 265 HC$3.00 MF$0.65

THE EFFECTS OF CONDUCTOR TEMPERATURE ON THE QUALITY OF EXTRUDED VINYL WIRE INSULATION,
Bakelite Co Bound Brook N J
For primary bibliographic entry see Field 13H.
AD-656 266 HC$3.00 MF$0.65

QUALITY CONTROL OF VINYL AND POLYETHYLENE ELECTRICAL INSULATING AND JACKETING MATERIALS,
Bakelite Co Bound Brook N J
For primary bibliographic entry see Field 11I.
AD-656 268 HC$3.00 MF$0.65

THE APPLICATION OF SILICONE RUBBER INSULATED WIRES AND CABLES,
General Electric Co Bridgeport Conn Wire and Cable Dept
L. B. Short. 1954, 8p
Wire and Cable Symposium (3rd), Asbury Park, N. J., December 6-9, 1954.

Descriptors: (*Silicone plastics, Rubber coatings), (*Electric insulation, Silicone plastics), Electric wire, Electric cables, Electrical properties, Hardness, Aging (Materials), Tensile properties.

The paper discusses several of the properties and applications of Silicone insulated wire and cable. Two of the most important characteristics of Silicone rubber are its high temperature resistance and low temperature flexibility.
AD-656 270 HC$3.00 MF$0.65

AN EVALUATION OF VINYL HOOK-UP WIRES,
Brand-Rex Div Willimantic Conn
A. H. Lybeck, and S. J. Trykowski. 1954, 32p
Annual Wire and Cable Symposium, Asbury Park, N. J., December 7-9, 1954.

Descriptors: (*Electric cables, Subminiature electronic equipment), (*Polyvinyl chloride, Electric insulation), High-temperature research, Electrical properties, Physical properties, Chemical properties, Performance (Engineering), Experimental data.

Three polyvinyl chloride insulation compounds used for hook-up wire were tested to determine (a) basic electrical, physical, and chemical properties, (b) suitability for use throughout a range of operating temperatures, and (c) the effect of high temperatures in particular on electrical and physical characteristics. Two of these compounds, T-711 and T-740, are commercially available for JAN-C-76 and U/L 105C applications, respectively; the third, T-540, has been specifically formulated to afford optimum performance throughout a wide temperature range.
AD-656 273 HC$3.00 MF$0.65

HOT GAS WELDED SPLICE CLOSURES FOR PLASTIC CABLES,
Ansonia Wire and Cable Co Conn
For primary bibliographic entry see Field 13H.
AD-656 274 HC$3.00 MF$0.65

THE EFFECTS OF RADIATION ON SILICONE RUBBER WIRE AND CABLE INSULATION,
Dow Corning Corp Midland Mich Product Engineering Labs
C. G. Currin. 1958, 21p
Annual Wire and Cable Symposium (7th), Asbury Park, N. J., December, 1958.

Descriptors: (*Electric insulation, Radiation damage), Electric wire, Electric cables, Nuclear radiation, Nuclear reactors, Silicones, Rubber, Electrical properties, Dielectric properties.

Conclusions: Dielectric properties of silicone rubber insulation are not permanently affected to a significant degree by gamma irradiation; Dielectric losses during irradiation are no higher than before or after the exposure; Physical properties of silicone rubber wire and cable insulation are damaged by irradiation; Irradiation at 200C has the same general effects as irradiation at 25C except that the rate of damage is accelerated 4 to 10 times; Differences in radiation resistance between silicone rubber stocks is greater when irradiated at 200C than at 25C; Since wire and cable insulation must perform both electrically and physically, the effects of radiation on physical properties limit the life; For those applications where a life greater than 5 megarads is necessary, all of the generalized information necessary to predict insulation performance is not yet available.
AD-656 276 HC$3.00 MF$0.65

ELECTRON PROCESSING TECHNIQUES FOR WIRE AND CABLE IRRADIATION,
High Voltage Engineering Corp Burlington Mass
D. A. Trageser. 1958, 17p

Descriptors: (*Electric cables, Electron bombardment), (*Electric insulation, *Electron bombardment), Radiation damage, Costs, Physical properties, Manufacturing methods, Efficiency, Elastomers, Tapes, Polyethylene plastics.
Identifiers: Electron processing.

A wide range of wire and cable sizes can be processed continuously with various engineering techniques. The choice of technique depends on the wire geometry and beam energy. These two factors also significantly affect the process efficiency, and hence the production rate and cost. Single-sided treatment is restricted to very small wires, and the efficiency is very low. Double bombardment, however, can be used on a wide variety of wire sizes. It improves the efficiency markedly. Rotary treatment increased the efficiency further, and is most suitable for large cables. Inclined-angle processing with a low beam energy in double bombardment is the most efficient way for thin insulation. (Author)
AD-656 277 HC$3.00 MF$0.65

NUCLEAR RADIATION, A NEW ENVIRONMENT,
Battelle Memorial Inst Columbus Ohio
For primary bibliographic entry see Field 18H.
AD-656 278 HC$3.00 MF$0.65

AN AIR-LAYABLE CARRIER FREQUENCY CABLE FOR MOBILE WARFARE,
ITT Federal Labs Nutley N J
W. C. Murray. 1958, 29p
Prepared for presentation at the Annual Symposium Technical Progress in Communication Wires, and Cables (7th), Asbury Park, N. J., December 2, 3, and 4, 1958.

Descriptors: (*Electric cables, Tactical warfare), Coaxial cables, Military requirements, Electric wire, Copper, Polyethylene plastics, Plastic coatings, Airborne, Design, Installation, Attenuation, Electrical impedance, Packaging.

A cable was developed which is similar in size, weight, flexibility, and handling properties to World War II field wire WIIOB. The cable can be compared with Spiral-Four cable developed 10 years ago, however, a four fold increase in channel capacity is achieved and at the same time, the weight and cost are cut in half. This cable gives the user the new capability of airlaying cable circuits across impassable, contaminated or enemy controlled terrain at speeds up to 100 MPH. This means, for example, a 10-mile cable circuit complete with unattended repeaters can be installed in less than 10 minutes. (Author)
AD-656 283 HC$3.00 MF$0.65

ENJAY BUTYL IN LOW VOLTAGE APPLICATIONS,
Enjay Labs Linden N J
For primary bibliographic entry see Field 11J.
AD-656 284 HC$3.00 MF$0.65

EVALUATION OF MULTICONDUCTOR CABLES USED IN GROUND TO AIR GUIDED MISSILE SYSTEMS,
Frankford Arsenal Philadelphia Pa
T. J. Horan, and J. J. Roache. Dec 58, 17p
Prepared for presentation at the Wire and Cable Symposium (7th), at Asbury Park, N. J., Dec 58.

Descriptors: (*Electric cables, *Guided missiles (Surface-to-air)), Thermoplastics, Electric insulation, Performance (Engineering), Plastic coatings, Silicone plastics, Polyvinyl chloride, Nylon, Polyethylene plastics, Rubber coatings.

It was concluded that a properly fabricated cable with thermoplastic primary insulation will perform as well as any other materials tested. Silicone rubber insulated conductors in limited numbers were tested under this program and were found to be satisfactory. Silicone rubber as jacketing material was considered not satisfactory due to failures during mechanical testing. Data presented in this paper will prove helpful to assist cable manufacturers in keeping abreast of the increasing severe Military requirements and of the progress attained in this area.
AD-656 289 HC$3.00 MF$0.65

LOW LOSS COAXIAL CABLE FOR HIGH TEMPERATURE SERVICE,
Edison (Thomas A) Industries West Orange N J
W. A. Donohue, and F. T. Smith. Dec 58, 16p
Prepared for presentation at the Annual Symposium on Communication Wire and Cable (7th), Asbury Park, N. J., 2-4 Dec 58.

Descriptors: (*Coaxial cables, Refractory materials), High-temperature research, Silicon dioxide, Oxides, Attenuation, Dielectrics, Dielectric properties, Thermal properties, Stability, Stresses.

The investigation which was conducted on refractive oxide systems for use in high temperature coaxial cable showed that a properly processed silica can yield a cable which has minimum attenuation rise with temperature and excellent attenuation stability under thermal variation and mechanical stressing. This cable can be fabricated reproducibly and is comparable in its characteristics to the RG-142/U. (Author)
AD-656 290 HC$3.00 MF$0.65

COMPOSITE WIRES FOR OPERATION AS ELECTRICAL CONDUCTORS AT ELEVATED TEMPERATURES,
Sylvania Electric Products Inc Warren Pa
James R. Howell. Dec 58, 8p
Prepared for presentation at the Annual Wire and Cable Symposium on Technical Progress in Communication Wires and Cables (7th), Asbury Park, N. J., 2-4 Dec 68.

Descriptors: (*Electric wire, Copper alloys), (*Copper, Cladding), Nickel alloys, High-temperature research, Electrical properties, Corrosion resistance, Tensile properties, Thickness.

Several factors have to be considered when specific properties are desired in a high temperature wire. These include: (1) Conductivity; (2) Temperature coefficient of resistivity; (3) Oxidation resistance and resistance to other corrosive media; (4) Tensile strength at room and elevated temperatures; (5) Thickness of protective coating. Many times a specific property can only be attained at the sacrifice of one or more other properties. Therefore, to design a composite, the desirable characteristics must be clearly spelled out, and the best possible compromise between all the factors has to be determined--first, by calculation, and secondly, by long and tedious testing. In general, a compromise can usually be made and the optimum conductor developed. (Author)
AD-656 291 HC$3.00 MF$0.65

DEVELOPMENT AND APLLICATION NOTES ON 'THIN-WALL' TEFLON INSULATED WIRE AND CABLE,
Inso Electronic Products Inc Nutley N J
Jerome I. Cohn. Dec 58, 13p
Annual Wire and Cable Symposium (7th), Asbury Park, N. J., 2-4 Dec 58.

Descriptors: (*Electric cables, Subminiature electronic equipment), (*Halocarbon plastics, Electric insulation), Tape wound construction, Performance (Engineering), Oxidation, Soldered joints, Failure (Mechanics), Reliability.

Topics included are: Saving of space and weight; Long lengths - pin-hole free; Concentricity of insulation; Oxidation of silver plated conductor; Breakage of wire at soldered joints; Marking of teflon wire.
AD-656 292 HC$3.00 MF$0.65

FLAME RETARDANT POLYETHYLENE FOR WIRE AND CABLE,
Rome Cable Corp N Y
For primary bibliographic entry see Field 11I.
AD-656 293 HC$3.00 MF$0.65

EVEN COUNT POLYETHYLENE INSULATED CABLE,
Bell Telephone Labs Inc Murray Hill N J
F. W. Horn. Dec 58, 22p
Prepared for presentation at the Annual Technical Symposium on Commercial Wires and Cables (7th), at Asbury Park, N. J., 2-4 Dec 58.

Descriptors: (*Electric cables, Identification systems), (*Polyethylene plastics, Electric insulation), Colors, Identification, Configuration.

The paper follows the evolution of even count cable, the conditions that paved the way for its introduction, the development problems involved and last but by far not the least the many advantages of the even count system.
AD-656 294 HC$3.00 MF$0.65

RODENT ATTACK ON RUBBER- AND PLASTIC-INSULATED WIRES AND CABLES,
Sieverts Kabelverk Ab Sundbyberg (Sweden)
B. F. Lizell, J. S. L. Roos, and G. R. Bjorck. Dec 58, 10p
Prepared in cooperation with Kungliga Veterinarhogskolan, Stockholm (Sweden), Dept. of Animal Husbandry. Annual Wire and Cable Symposium (7th), at Asbury Park, N. J., 2-4 Dec 58.

Descriptors: (*Electric cables, *Pest control), Sweden, Electric insulation, Rodents, Rats, Rubber coatings, Plastic coatings, Polyvinyl chloride, Metal coatings, Damage, Additives.

Rodent attack on different rubber and plastic materials has been investigated. The tests were made partly on cylindrical samples, partly on insulated cables with and without various additives tried as rat repellents. White rats were used in the tests, and the animals had normal supply of fresh water and feed. All rubber and plastic materials under test were attacked, the degree of attack increasing with the softness of the materials. A thick aluminium or steel tape gave the only complete protection. Z. A. C. had some rat-repelling effect. (Author)
AD-656 295 HC$3.00 MF$0.65

PLASTIC AERIAL CABLE CONSTRUCTION,
Neale Construction Co Inc Topeka Kans
D. J. Neal, Sr. 1967, 11p

Descriptors: (*Transmission lines, Installation), Electric cables, Plastic coatings, Weight, Telephone lines.

Plastic cables should be given the same careful consideration and treatment that we have given lead cable over the past years. It was not originally meant to be self-supporting nor was it intended to be used in a haphazard manner; but since there was a critical shortage of lead for the manufacture of cable sheath, a substitute had to be found, and as in many cases, this particular substitute has shown some qualities which have very distinct advantages over the original article. Two of these superior qualities are its light weight and its ease of handling in aerial cable construction.
AD-656 313 HC$3.00 MF$0.65

PRELASHING AERIAL CABLE,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 17B.
AD-656 314 HC$3.00 MF$0.65

FACTORS IN THE SELECTION OF CARRIER SYSTEMS.
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 17B.
AD-656 315 HC$3.00 MF$0.65

MODEL TESTS OF A SURFACE-WAVE TRANSMISSION LINE FOR LONG DISTANCE COMMUNICATION,
Signal Corps Engineering Labs Fort Monmouth N J
G. Goubau, and C. E. Sharp. 1955, 13p

Descriptors: (*Transmission lines, Models (Simulations)), Attenuation, Communication systems, Polyethylene plastics, Dielectric properties, Meteorological parameters, Mathematical analysis.

It appears entirely possible to construct a Surface-Wave Transmission Line (SWTL) for long distance transmission with 100 Mc or more bandwidth having an average loss of 3 to 5 db per mile. For instance, if the conductor diameter is 0.4 inch and the outer diameter of the line 1 inch, and if the dielectric layer consists of natural polyethylene with a light protecting coat, the calculated loss is 2.2 db/mile at 100 Mc/s and 3.4 db/mile at 200 Mc/s. The actual loss will be about 10% higher due to imperfections of the conductor surface which are always present. If the supporting loss is 0.5 db/mile then the loss of a straight line section will be about 3 db/mile at 100 Mc/s and 4.2 db/mile at 200 Mc/s. At these frequencies the line is not affected by rain. Dry snow and thin layers of ice have little effect on the transmission loss. Therefore such a line should be applicable in areas where severe icing conditions occur rarely or not at all.
AD-656 316 HC$3.00 MF$0.65

ELECTROMAGNETIC DELAY LINES,
ITT Federal Labs Nutley N J
H. G. Nordlin. 1953, 12p
Prepared for presentation at the Technical Symposium on Communication Wires and Cables, Asbury Park, N. J., December 14-16, 1953.

Descriptors: (*Delay lines, Performance (Engineering)), Magnetic materials, Efficiency, Phase shift.

The article discussed the properties which are considered ideal for a distributed parameter delay cable and shown what type of deviations occur from this ideal in a few high quality cables. In addition the important improvements in efficiency which appear to be possible by the use of low-loss magnetic materials have been illustrated by means of data measured on an experimental cable. (Author)
AD-656 317 HC$3.00 MF$0.65

SEMI-SOLID COAXIAL CABLES WITH INTEGRAL-FIN INSULATION,
United States Rubber Co Bristol R I Bristol Plant
John F. S. Abbott. 1953, 12p
Annual Wire and Cable Symposium, Asbury Park, N. J., December 14, 15, 16, 1953.

Descriptors: (*Coaxial cables, Electric insulation), Polyethylene plastics, Air, Dielectrics, Design, Stability, Extrusion.

The paper describes an improved type of flexible, low-loss coaxial cable with an air-polyethylene dielectric. This new integral-fin semi-solid construction was developed through the use of special extrusion apparatus which produces the entire insulating structure in one continuous, economical operation. The resulting uniform, bonded structure provides protection against surface oxidation of the inner conductor, minimizes distortion of a stranded inner conductor upon bending, and promotes structural stability during subsequent production operations and in cable installation and service. To the coaxial cable user, these improvements add up to greater stability in electrical characteristics during the service life of the cable, along with the well-known semi-solid advantages of lower attenuation at equal diameter or smaller diameter and lighter weight with equal attenuation, in comparison to solid insulated cable. (Author)
AD-656 318 HC$3.00 MF$0.65

STATUS OF POLYMONOTRIFLUOROCHLOROETHYLENE INSULATED WIRE,
Brand-Rex Div Willimantic Conn
L. A. Walters. 1967, 5p

Descriptors: (*Halocarbon plastics, *Electric insulation), (*Electric wire, *Plastic coatings), Military requirements, Performance (Engineering), Extrusion, Quality control.

Topics included are: military requirements, properties of polymonotrifluoro-chloroethylene; extrusion problems; color coding; control methods; present and future wire applications.
AD-656 319 HC$3.00 MF$0.65

LAYTEX INSULATION FOR COMMUNICATION AND CONTROL CABLES,
United States Rubber Co Bristol R I Bristol Plant
For primary bibliographic entry see Field 11J.
AD-656 321 HC$3.00 MF$0.65

BAKELITE CELLULAR POLYETHYLENE,
Bakelite Co Bound Brook N J
For primary bibliographic entry see Field 11I.
AD-656 324 HC$3.00 MF$0.65

USE OF SILICONES IN SHIPBOARD CABLES,
Bureau of Ships Washington D C
C. Michael van Lear. 1953, 5p
Prepared for presentation at the Wire and Cable Symposium, Asbury Park, N. J., December 14-16 1953.

Descriptors: (*Electric cables, Silicones), Shipborne, Silicone plastics, Electric insulation, Specifications, Performance (Engineering).

Silicones and silicone treated materials in various forms have found many applications within the Department of the Navy. One of the principal applications in the Bureau of Ships is in the electrical cables designed for use in Naval vessels. This article shows the usage, and outlines some of the problems that were encountered in developing the design and performance characteristics of these cables.
AD-656 325 HC$3.00 MF$0.65

A NEW MATERIAL FOR SPLICING WIRE AND CABLE,
Minnesota Mining and Mfg Co St Paul
E. W. Bollmeier. 1953, 10p
Annual Wire and Cable Symposium, 1953.

Descriptors: (*Electric wire, Joining), (*Electric cables, Joining), (*Epoxy plastics, Electric insulation), Molding, Joints.

The paper discusses current progress in the development of technique and accessories for the use of liquid epoxy casting resins in splice insulation.
AD-656 326 HC$3.00 MF$0.65

MINERAL INSULATED WIRING,
General Cable Corp Bayonne N J
G. S. Eager, Jr., and S. P. Lamberton. 1953, 8p
Annual Wire and Cable Symposium (2nd), Asbury Park, N. J., December 14-15-16, 1953.

Descriptors: (*Electric cables, Electric insulation), (*Magnesium oxides, *Electric insulation), Minerals, Manufacturing methods, Copper coatings, Wear resistance, Dielectric properties.

Type MI mineral insulated cable is truly a self-contained wiring system of insulated conductors and a rugged overall seamless protective copper sheath. This cable is able to withstand severe twisting, bending, and deforming pressures because the conductors do not shift or migrate within the dense highly compressed magnesium oxide within the copper sheath. This cable will operate over a temperature range of -40 to 85 C with standard (Type O) terminations and up to 250 C with special terminations. In addition to general wiring uses for service up to 600 volts maximum it has many uses as a communications cable by virtue of its excellent dielectric properties. (Author)
AD-656 327 HC$3.00 MF$0.65

SILICONE INSULATED CABLE PRACTICE,
Signal Corps Engineering Labs Fort Monmouth N J
For primary bibliographic entry see Field 11J.
AD-656 329 HC$3.00 MF$0.65

SILICONE RUBBER AS CABLE INSULATION,
Dow Corning Corp Midland Mich
J. F. Dexter, and P. C. Servais. Dec 53, 29p
Prepared for presentation at the Army Signal Corps Wire and Cable Symposium, Asbury Park, N. J., 14-16 Dec 53.

Descriptors: (*Silicone plastics, Electric insulation), (*Electric insulation, *Synthetic rubber), Electric cables, Electrical properties, Manufacturing methods, Physical properties, Additives.

Several typical silicone rubbers were reviewed briefly showing the improvements made in their properties during the past few years. A new type of silicone rubber using an improved fumed silica as a filler was reviewed in detail. These fumed silica filled silicone rubber stocks are believed to have the best electrical properties and the widest utility of any silicone rubber available today for general application as cable insulation. The electrical properties are stable over a wide temperature range and are not affected adversely by moisture, corona, weathering, or aging at high temperature. These stocks can be fabricated using conventional methods or a hot air method not requiring steam as a vulcanizing medium. (Author)
AD-656 331 HC$3.00 MF$0.65

THICKNESS MEASUREMENT AND CONTROL IN THE MANUFACTURE OF POLYETHYLENE CABLE SHEATH,
Western Electric Co Inc Kearny N J
For primary bibliographic entry see Field 11C.
AD-656 332 HC$3.00 MF$0.65

QUALITY - A COMBINATION OF HORSESENSE AND STATISTICAL METHODS,
Rome Cable Corp N Y
For primary bibliographic entry see Field 13H.
AD-656 333 HC$3.00 MF$0.65

FATIGUE LIFE OF STRANDED HOOK-UP WIRE,
Surprenant Mfg Co Boston Mass
Donald C. Alexander. 1953, 9p
Prepared for presentation at the Annual Symposium on Technical Progress in Communication Wires and Cables, Asbury Park, N. J., December 14, 1953.

Descriptors: (*Electric cables, Fatigue (Mechanics)), Life expectancy, Experimental data, Electric connectors, Copper, Copper alloys, Aluminum alloys, Bronze, Cadmium alloys, Beryllium alloys, Physical properties, Performance (Engineering).

Hoop-up wires are exposed to three types of fatigue: (1) vibration; (2) sharp bending during installation, modification, and servicing; and (3) intentional flexing in service. As stated, vibration is very difficult to simulate in the laboratory. The second type, sharp installation-bending, is also difficult to reproduce because each installation and each installing activity have different wiring problems and technicians servicing equipment in the field subject the wires to varying degrees of abuse. When, as in the third case, a cable is required for flexing service, the application is usually known in advance so that laboratory procedures may be established which will accurately simulate the service use. In order to make laboratory studies of vibration and installation difficulties some sort of bending techniques must be resorted to in an attempt to evaluate the relative merits of wires and to compare constructions, materials, and installation techniques. This paper presents experimental data obtained for the purpose of solving such problems.
AD-656 334 HC$3.00 MF$0.65

SPIRAL MULTICOLORED PVC WIRE,
Swiss Insulating Works Ltd Breitenbach
For primary bibliographic entry see Field 17B.
AD-656 369 HC$3.00 MF$0.65

CROSSTALK ON CARRIER CABLES,
Submarine Cables Ltd London (England)
K. E. Latimer. 1955, 16p
Annual Wire and Cable Symposium, Asbury Park, N. J., December 6th-8th, 1955.

Descriptors: (*Electric cables, Interference), Great Britain, Theory, Transmission lines, Attenuation.

The paper is a brief survey, therefore incomplete, of the theory of crosstalk at fairly high frequencies in quadded carrier cables, particularly those of the plastic type. The less familiar aspects of the subject have mostly been chosen for discussion, although some parts of the classical theory of crosstalk have been included for the sake of logical continuity. Many other topics will be found in the bibliography cited below. In choosing these references, an attempt has been made to indicate the large amount of work carried out in recent years in Germany, France, Holland, and Denmark. In some cases contradictions and fallacies have been pointed out, and in one instance a revision of methods of testing cables is advocated. Typical crosstalk figures measured on plastic carrier cables have been quoted. (Author)
AD-656 370 HC$3.00 MF$0.65

PROTECTION PROBLEMS ON TELEPHONE DISTRIBUTION SYSTEMS,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 17B.
AD-656 373 HC$3.00 MF$0.65

POLYETHYLENE-INSULATED TELEPHONE CABLE,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 17B.
AD-656 374 HC$3.00 MF$0.65

RURAL WIRE AND URBAN WIRE FOR TELEPHONE DISTRIBUTION SYSTEMS,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 17B.
AD-656 375 HC$3.00 MF$0.65

TRANSMISSION CHARACTERISTICS OF RURAL DISTRIBUTION WIRE AT AUDIO AND CARRIER FREQUENCIES,
Whitney Blake Co New Haven Conn
John A. Brazee. 1955, 16p
Prepared for presentation at the Annual Symposium (4th), on Technical Progress in Communications Wire and Cables, Asbury Park, N. J., December 7, 1955.

Descriptors: (*Transmission lines, Rural areas), Electrical properties, Attenuation, Phase shift, Audiofrequency, Very low frequency, Low frequency, Medium frequency.

An effort was made to correlate the theoretical electrical behavior of rural distribution wire and the actual measured characteristics. Primary and secondary constants, representative of the wire during both dry and wet weather, are presented. The transmission characteristics of rural distribution wire generally are more closely related to the 19 gage paper insulated cable than to the present open wire systems. (Author)
AD-656 376 HC$3.00 MF$0.65

MILITARY APPLICATIONS OF SILICONE RUBBER INSULATED WIRE AND CABLE,
Dow Corning Corp Midland Mich
R. S. Naegele, J. F. Dexter, and P. C. Servais. 1955, 24p
Prepared for presentation at the Wire and Cable Symposium (4th), December 1955.

Descriptors: (*Silicone plastics, Electric insulation), (*Synthetic rubber, *Electric insulation), Electric wire, Electric cables, Military requirements, Physical properties, Dielectric properties, Moistureproofing.

The development of silicone rubber with improved physical strength and excellent dielectric and moisture resistant properties have resulted in the application of these materials as primary insulation for transformers, large industrial motors and traction equipment. These applications have capitalized on the advantages of silicone rubber over other insulating systems. This success indicates that many difficult wire and cable requirements may also be solved using silicone rubber.
AD-656 378 HC$3.00 MF$0.65

R. F. POWER RATINGS OF TEFLON COAXIAL CABLES,
American Phenolic Corp Chicago Ill
G. J. Mares, and C. C. Camillo. 1955, 26p
Prepared for presentation at the Annual Symposium on Technical Progress in Communication Wires and Cables (4th), Asbury Park, N. J., December 6-8, 1955.

Descriptors: (*Coaxial cables, *Halocarbon plastics), Radiofrequency power, Performance (Engineering), Data.

The increased power handling capacity of the Teflon cables over the equivalent polyethylene cables is clearly demonstrated. Excluding the Teflon tape cable construction for the moment, the sizable increase in power handling performance of Teflon over polyethylene would certainly warrant its use wherever possible. Where a large diameter polyethylene cable is being used, a small diameter Teflon cable could be substituted with the advantage

of weight reduction, increased maximum power capacity and a higher maximum operating temperature. For instance, from a power handling viewpoint, RG-87A/U cable could easily be used where RG-17/U is now used. RG-17/U handles 4500 watts at 100 megacycles while RG-87A/U handles 6500 watts. At 4000 megacycles, RG-17/U handles 350 watts and RG-87A/U handles 750 watts. Therefore, RG-87A/U, if substituted for RG-17/U, would not have to be operated at its maximum rating to equal and outperform RG-17/U. One might even wish to use RG-115/U in place of RG-17/U. At 100 megacycles, the power ratings of both cables are quite close while at 4000 megacycles, RG-115/U can carry 450 watts and RG-17/U carries 350 watts. In addition, RG-115/U has the advantage of greater flexibility and improved temperature dimensional stability as compared to RG-87A/U. Where high temperatures will be encountered due to high power requirements, and compactness and weight are significant factors, the Project Engineer will certainly do well to investigate the utilization of a Teflon dielectric coaxial cable. (Author)
AD-656 379 HC$3.00 MF$0.65

PROGRESS IN AIR DIELECTRIC CABLES,
Habirshaw Cable and Wire Corp Yonkers N Y
Edwin J. Merrell, A. Laird McKean, and John Arbuthnott, Jr. 1955, 13p
Annual Wire and Cable Symposium, Asbury Park, N. J., December 6-8, 1955.

Descriptors: (*Electric cables, Dielectrics), (*Dielectrics, Air), Aluminum, Pipes, Copper, Metal coatings, Attenuation, Dielectric properties, Coaxial cables, Design, Helixes, Tape wound construction, Polyethylene plastics, Mechanical properties.

A number of different types of semi-flexible air dielectric cables have been developed recently. These designs all incorporate a means of continuous axial support of the inner conductor, together with an aluminum tube, copper braid or corrugated metal outer shield. Several of these constructions, their characteristics and advantages are described.
AD-656 381 HC$3.00 MF$0.65

THE ELECTRICAL AND MECHANICAL CHARACTERISTICS OF HELICAL MEMBRANE CABLE,
Dow Chemical Co Midland Mich
R. C. Mildner, and R. J. Slaughter. 1955, 16p
Annual Wire and Cable Symposium, Asbury Park, N. J., December 6-8 1955.

Descriptors: (*Coaxial cables, Helixes), Aluminum coatings, Polyethylene plastics, Electric insulation, Membranes, Disks, Styrene plastics, Halocarbon plastics, Design, Electrical properties, Performance (Engineering).

The construction and electrical characteristics of a range of aluminium-sheathed air-spaced coaxial cables, suitable for operation over a wide range of frequencies, are briefly described. The mechanical characteristics of these cables are then considered and a theory of differential expansion of a coaxial pair is developed. Reference is made to the experimental work undertaken to establish the constants required by the theory and to verify the results given by calculation. It is found that under conditions of no load the cable will meet all the conditions imposed by ambient temperatures ranging from -40C. to +55C. The cable can also be safely operated with power corresponding to the standard rating of the cable applied, but attention is drawn to certain potentially dangerous conditions of installation and operation. Brief reference is made to recent developments in these cables to extend their working range of temperature using new materials, such as polytetrafluorethylene, the linear polyethylenes and irradiated polythene. (Author)
AD-656 382 HC$3.00 MF$0.65

DEVELOPMENT OF WEATHER-RESISTANT VINYL JACKETS,
Bakelite Co Bound Brook N J
For primary bibliographic entry see Field 11I.
AD-656 385 HC$3.00 MF$0.65

DEVELOPMENTS IN SUBMARINE COMMUNICATION CABLES,
Simplex Wire and Cable Co Cambridge Mass
J. J. Gilbert. 1955, 9p
Annual Wire and Cable Symposium, Asbury Park, N. J., December 6, 7 and 8, 1955.

Descriptors: (*Submarines, *Electric cables), Underwater, Radio equipment, Electric insulation, Hydrostatic pressure, Radio transmission, Plastic coatings.

The submarine cable, now over 100 years old, is discussed. There are still in operation today sections of cable as old as 75 years. The conservative traditions of the art acted as a block to progress in improving the cable itself. However, there was continuous improvement in the terminal equipment, involving among other things ingenious mechanical gadgets to amplify and shape the signals and to reduce the effect of static noise. When the time came to apply vacuum tube circuits to submarine terminal equipment, it was found to be a difficult matter to replace these mechanical appliances by electrical circuits.
AD-656 386 HC$3.00 MF$0.65

RECENT DEVELOPMENTS IN POLYETHYLENE INSULATING MATERIALS,
Bakelite Co Bound Brook N J
For primary bibliographic entry see Field 11I.
AD-656 388 HC$3.00 MF$0.65

CHEMICALLY CROSS-LINKED POLYETHYLENE,
General Electric Co Bridgeport Conn Wire and Cable Dept
For primary bibliographic entry see Field 11I.
AD-656 390 HC$3.00 MF$0.65

FOAMED POLYETHYLENE COAXIAL CABLES,
American Phenolic Corp Chicago Ill
C. C. Camillo, and G. R. Karlson. 1957, 29p
Prepared for presentation at the Annual Symposium on Technical Progress in Communication Wires and Cables (6th), Asbury Park, N. J., December 3-5, 1957.

Descriptors: (*Coaxial cables, *Polyethylene plastics), Expanded plastics, Moistureproofing, Dielectrics, Performance (Engineering), Experimental data, Attenuation, Aging (Materials).

Coaxial cables using foamed or cellular polyethylene were constructed. One of these cables having the same overall diameter and characteristic impedance as the standard solid dielectric RG-11/U type was investigated in detail. The results of tests conducted in the humidity chamber showed that water vapor is capable of penetrating the jacket of the cable, entering the individual cells of the dielectric and increasing the losses of this cable. It was further demonstrated that the means by which the ends of the cable are sealed can affect the magnitude of the attenuation increase by a factor of two to one. Although water vapor can enter the cellular dielectric, the increase in attenuation which results is only approximately 11 percent of the original value at 250 mc whereas at this same frequency the cellular dielectric cable has 32 percent less attenuation than the solid dielectric RG-11/U cable. This still represents a 25 percent advantage of the cellular dielectric cable over the solid dielectric cable in the same physical size. Based upon these results, the use of cellular polyethylene dielectrics in coaxial cables appears to offer decided advantages by providing lower losses and lower capacitance without sacrificing physical size and weight.
AD-656 402 HC$3.00 MF$0.65

HIGH-TEMPERATURE AIRCRAFT WIRES,
General Electric Co Bridgeport Conn
W. F. Horstman, and H. L. Wilson. 1957, 21p
Annual Wire and Cable Symposium (6th), Asbury Park, N. J., December 3, 4 and 5, 1957.

Descriptors: (*Aircraft equipment, *Electric wire), Electric insulation, High-temperature research, Heat-resistant materials, Wire, Silicone plastics, Halocarbon plastics, Glass textiles, Polyester plastics, Plastic coatings, Flammability, Mechanical properties.

The use and development of wire for aircraft application is discussed. The increasing reliance on electrical control and operation, with consequent increase in the size and complexity of the electrical system, has resulted in the need for substantial reductions in weight and bulk of the wiring system.
AD-656 403 HC$3.00 MF$0.65

DESIGN OF WIRE AND CABLE FOR DIRECT BURIAL IN RURAL TELEPHONE SYSTEMS OF REA BORROWERS,
Rural Electrification Administration Washington D C
For primary bibliographic entry see Field 17B.
AD-656 405 HC$3.00 MF$0.65

PROPOSED REA SPECIFICATION FOR THERMOPLASTIC-INSULATED, THERMOPLASTIC SHEATHED CABLES INTENDED FOR DIRECT BURIAL USE IN TELEPHONE SYSTEMS OF REA BORROWERS.
Rural Electrification Administration Washington D C
For primary bibliographic entry see Field 17B.
AD-656 406 HC$3.00 MF$0.65

BURIED RURAL TELEPHONE DISTRIBUTION SYSTEMS,
Southern Bell Telephone and Telegraph Co Atlanta Ga
For primary bibliographic entry see Field 17B.
AD-656 407 HC$3.00 MF$0.65

LOW LOSS CABLE FOR MICROWAVE SERVICE,
ITT Federal Labs Nutley N J
I. T. Stoneback, and J. P. Agrios. 1957, 23p
Annual Wire and Cable Symposium (6th), Asbury Park, N. J., 3,4, and 5, 1957.

Descriptors: (*Coaxial cables, Microwave frequency), (*Polyethylene plastics, Electric insulation), Electric cables, Expanded plastics, Dielectrics, Attenuation, Performance (Engineering), Extrusion, Microwave equipment.

An investigation was conducted on cellular polyethylene as a further means of reducing the losses in cables at the super high frequencies it showed that the presently commercially available cellular polyethylene compounds are not suitable for such frequencies. The main objection is the increase of the power factor due to the polar residue which results from the blowing agent utilized in such compounds. The effect of moisture on the power factor has proven to be disastrous for the attenuation in the cables. In extruding foam-polyethylene compounds, great care must be utilized in order to maintain consistent expansion to make a cable with uniform capacitance and characteristic impedance. By utilizing a 1/1 weave and smaller size braid wires for the outer conductor, a modified cable was fabricated which is lighter, has superior attenuation stability, and somewhat lower attenua-

tion at 10,000 mc than standard RG-9B/U. (Author)
AD-656 408 HC$3.00 MF$0.65

EXPERIENCES WITH SELF-SUPPORTED PLASTIC COMMUNICATION CABLE,
General Telephone Co of Illinois Springfield
For primary bibliographic entry see Field 17B.
AD-656 410 HC$3.00 MF$0.65

CABLE SPLICING GOES MODERN,
Bell Telephone Labs Inc Murray Hill N J
W. C. Kleinfelder. 1957, 5p
Annual Wire and Cable Symposium (6th), Asbury Park, N. J., December 3, 1957.

Descriptors: (*Electric cables, *Joining), Efficiency, Dies, Small tools, Pneumatic devices.

The 'punched-sleeve' method of cable splicing results in the splicer's making better joints more rapidly and efficiently than by the traditional method. (Author)
AD-656 411 HC$3.00 MF$0.65

A FIELD STUDY OF THE SHEAR TYPE SEALING CONNECTOR,
Minnesota Mining and Mfg Co St Paul
E. W. Bollmeier. 1957, 17p
Annual Wire and Cable Symposium, 1957.

Descriptors: (*Electric connectors, *Telephone lines), Moistureproofing, Electric insulation, Plastic coatings, Seals, Joining, Electric cables.

Both the advantages and limitations of the shear type, sealing connector, Model 1957, used in these studies are summarized and analyzed. The goal of 99.99% reliability was reached to within .08% and proven attainable. Modification of the connector to eliminate imperfection of the 1957 field study model has been initiated and is nearing completion. Final verification of these modifications will require further field observation in addition to the laboratory evidence accumulated at the date of this paper. It is expected that a commercial form of the connector utilizing the improvements made possible by field studies 1 and 2 will appear in 1958. (Author)
AD-656 412 HC$3.00 MF$0.65

EXTRUSION OF FAST CURING NEOPRENE WIRE AND CABLE COMPOUNDS,
Du Pont de Nemours (E I) and Co Wilmington Del Elastomers Div
For primary bibliographic entry see Field 13H.
AD-656 413 HC$3.00 MF$0.65

NEW DEVELOPMENTS IN HI-FAX COVERINGS FOR WIRE AND CABLE,
Hercules Powder Co Wilmington Del
For primary bibliographic entry see Field 11C.
AD-656 416 HC$3.00 MF$0.65

THE EFFECT OF STOCK TEMPERATURE ON THE PHYSICAL PROPERTIES OF POLYTHENE COATINGS FOR WIRE,
Canadian Industries Ltd New Toronto (Ontario) Plastics Div
For primary bibliographic entry see Field 11C.
AD-656 417 HC$3.00 MF$0.65

THE INTERRELATIONSHIP BETWEEN DENSITY AND DIELECTRIC STRENGTH OF HIGH PRESSURE POLYETHYLENE FOR HIGH VOLTAGE APPLICATIONS IN INSULATED WIRES,
Royal Electric Corp Pawtucket R I
For primary bibliographic entry see Field 11I.
AD-656 418 HC$3.00 MF$0.65

TECHNIQUES FOR INSULATING WIRE AND CABLE WITH SILICONE RUBBER,
Dow Corning Corp Midland Mich
For primary bibliographic entry see Field 13H.
AD-656 421 HC$3.00 MF$0.65

LEAKAGE OF ELECTROMAGNETIC ENERGY FROM COAXIAL CABLE STRUCTURES,
Army Signal Engineering Labs Fort Monmouth N J
Kurt Ikrath. 1957, 131p
Annual Wire and Cable Symposium, Asbury Park, N. J., December 5, 1957.

Descriptors: (*Coaxial cables, Leakage (Electrical)), Electromagnetic properties, Radiofrequency power, Electromagnetic fields, Boundary value problems, Transmission lines, Wave transmission, Mathematical analysis.

Starting with a general discussion of the field relations involved in the guidance of electromagnetic energy by cylindrical structures, the non-ideal boundary problem for a common coaxial cable is presented. Complete solutions for the outside leakage fields in terms of the cable voltage or cable currents have been derived for solid-wall shielded cables. The underlying conditions and the method of approach are thoroughly discussed and numerical examples are given. The physical significance of the solutions is demonstrated by showing the amount of power 'guided' along the outside of the cable as a function of the power flowing inside of the cable. The similarity of the leakage energy transmission phenomena with that of Sommerfelds' wire surface waves is emphasized. Formulas for the leakage fields emanating from braided cables are derived. The underlying concepts are discussed and the physical significance of the solutions is explained. Magnitude and polarization of the leakage fields emanating from braided cables are shown as a function of frequency by specific numerical examples. Formulas obtained in this way are of great value for further experimental work in this direction because they explain the generally observed but not well understood variation of the leakage as a function of frequency, with distance as a parameter. Measures regarding the suppression of electromagnetic leakage through mesh wire shields, e.g., cable braids, as well as the utilization of this type of leakage for wave launching devices are suggested. (Author)
AD-656 424 Not available from CFSTI.

EVALUATION TESTS OF A LOW-SINTER-TEMPERATURE, CERAMIC METALIZING PROCESS.
Army Eelctronics Command Fort Monmouth N J
For primary bibliographic entry see Field 13H.
AD-656 460 HC$3.00 MF$0.65

THE EFFECT OF CARBON BLACK SURFACE PROPERTIES ON THE STABILITY OF POLYETHYLENE,
Acheson Dispersed Pigments Co Philadelphia Pa
For primary bibliographic entry see Field 11G.
AD-656 501 HC$3.00 MF$0.65

SOME CONSIDERATIONS ON THE USE OF HIGH DENSITY POLYTHENE IN THE CABLE INDUSTRY,
Imperial Chemical Industries Ltd Wellwyn Garden City (England) Plastics Div
For primary bibliographic entry see Field 11I.
AD-656 502 HC$3.00 MF$0.65

HIGH POWER, LOW NOISE PULSE CABLE,
Signal Corps Engineering Labs Fort Monmouth N J
J. Argrios, and R. Feller. 1956, 22p
Annual Wire and Cable Symposium (5th), Asbury Park, N. J., December 4, 5, 6, 1966.

Descriptors: (*Pulse cables, Radiofrequency power), Electric insulation, Butyl rubber, Silicone plastics, Metal coatings, Performance (Engineering), Voltage, Attenuation, Electromagnetic shielding, Electric connectors, Noise (Radar), Radar equipment.

Four new types of high power, low noise rubber pulse cables have been developed that have high power handling capacities, considerable flexibility over the ambient temperature range of -55C to +55C, exhibit good corona stability after thermal cycling and effective shielding against the electromagnetic radiation eminating from these cables. A program has been established for the development of triaxial terminations for these cables. The terminations for the RG191 ()/U, RG-192 (0/U, RG-193 ()/U and RG-194 ()/U pulse cables will be of the not-head type and the cable assemblies will be manufactured at the factory, which will insure corona free operation and ease of assembly to the equipments. Triaxial connectors for the RG-190 ()/U pulse cable are currently being developed. It is anticipated that the termination for the RG-190 ()/U, RG-191 ()/U and RG-192 ()/U pulse cables will be available by May 1957. A hydrogen thyratron test and aging equipment has been installed to experimentally verify the performance characteristics and curves based on calculated data under high pulse voltage and short pulse conditions. The equipment is capable of 40 megawatts peak power output.
AD-656 503 HC$3.00 MF$0.65

'KEL-F' 500, A NEW FLUOROCARBON WIRE INSULATING MATERIAL,
Kellogg (M W) Co Jersey City N J
For primary bibliographic entry see Field 11I.
AD-656 504 HC$3.00 MF$0.65

INSULATED PARALLEL CIRCUIT WITH AIR DIELECTRIC FOR RURAL TELEPHONE SERVICE,
Rural Electrification Administration Washington D C
For primary bibliographic entry see Field 17B.
AD-656 506 HC$3.00 MF$0.65

SUBMARINE CABLE ACTIVITIES,
Navy Electronics Lab San Diego Calif
For primary bibliographic entry see Field 13J.
AD-656 507 HC$3.00 MF$0.65

C RURAL WIRE,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 17B.
AD-656 508 HC$3.00 MF$0.65

THE EXTRUSION OF 'TEFLON' 6 TETRAFLUOROETHYLENE RESIN FOR WIRE INSULATION.
Du Pont de Nemours (E I) and Co Wilmington Del Polychemicals Dept
For primary bibliographic entry see Field 13H.
AD-656 515 HC$3.00 MF$0.65

RESISTANCE OF RUBBER COVERED CABLE, JACKET, AND INSULATION STOCKS TO WEATHER AND ARTIFICIAL AGING,
Army Engineer Research and Development Labs Fort Belvoir Va
J. W. Bryden, F. Rupert, W. Smith, and F. Mitton. Dec 56, 32p
Annual Wire and Cable Symposium (5th) at Asbury Park, N. J., 4-6 Dec 56.

Descriptors: (*Synthetic rubber, Aging (Materials)), (*Electric cables, Aging (Materials)), Rubber coatings, Electric insulation, Environmental tests, Weatherproofing.

It was demonstrated that, by the use of four parts of wax, GR-S rubber can be compounded to experience practically no weather cracking when exposed unstressed for two years. GR-S can be so compounded as to undergo very limited weather cracking when exposed under stress for 24 months. However, the use of wax in itself is not adequate to ensure this characteristic; differences in types of wax, in compounding materials, and in methods of mixing and curing permit a wide range of results. Suitability of a specific type of rubber or formulation can be determined only by test. It was also demonstrated that low-temperature properties of military cables can be retained after exposure to desert conditions. A general correlation between tensile strength retention after exposure and weather cracking has been indicated. The results of this investigation emphasize the importance of developing a satisfactory accelerated weathering test which will more accurately predict outdoor suitability of rubber-like materials, and which can be used to compare correctly the merits of different materials.
AD-656 516 HC$3.00 MF$0.65

A SEALING CONNECTOR FOR SMALL INSULATED CONDUCTORS,
Minnesota Mining and Mfg Co St Paul
E. W. Bollmeier. 1956, 23p
Annual Wire and Cable Symposium (5th) at Asbury Park, N. J., Dec 1956.

Descriptors: (*Electric connectors, Moisture-proofing), Seals, Design, Electric cables, Plastics, Telephone lines.

The research, development and test results demonstrate that the general properties of the shear type sealing connector favorably match the overall specifications set down. A one piece connector capable of connecting 2 or 3 unstripped plastic or paper insulated conductors of differing or equal gage in one operation has been developed. The connector quickly and reliably seals the connection within a durable jacket in such a manner as to exclude moisture. An application tool, simple and non adjustable, has been provided. The connector described is primarily designed for connecting of conductors in 'pigtail' fashion, though other variations are being developed. The 'pigtail' arrangement has advantage in the respect that it permits the connection to be made outside the immediate conductor bundle. Such a feature permits faster and safer installation for tool applied connectors. The complete connector described in this paper has been designated the 'Scotchlok' TYPE T. This connector should contribute materially to maximum utilization of the inherent moisture-proof qualities of plastic telephone cable. (Author)
AD-656 517 HC$3.00 MF$0.65

ALUMINUM SHEATHING PRESS,
General Cable Corp New York
For primary bibliographic entry see Field 13I.
AD-656 519 HC$3.00 MF$0.65

SUBMINIATURE COAXIAL CABLE R.F. POWER RATINGS AND CONNECTOR CHARACTERISTICS,
Amphenol-Borg Electronics Corp Chicago Ill
G. J. Mares, and N. J. Sladek. 1956, 35p
Annual Wire and Cable Symposium (5th), Asbury Park, N. J., December 4-6, 1956.

Descriptors: (*Coaxial cables, Subminiature electronic equipment), Radiofrequency power, Electric connectors, Halocarbon plastics, Polyethylene plastics, Dielectrics, Performance (Engineering).

Experimental power rating values for subminiature Polyfluoron, polyethylene and Teflon dielectric coaxial cables are presented for the frequency range of 1 to 10,000 megacycles. These are maximum ratings and depend upon the safe operating temperature of the particular cable dielectric material. Six subminiature coaxial cables (1 Polyfluoron, 2 polyethylene and 3 Teflon) were investigated with the cable diameters ranging from .080 inches to .155 inches and representing characteristic impedances of 50, 75, and 95 ohms. Techniques and special equipment necessary to adapt the experimental apparatus for making measurements on the subminiature coaxial cables are discussed. In addition, these basic maximum ratings are theoretically extended to an ambient temperature range of -85F (-65C) to 400F (205C) to altitudes from sea level to 70,000 feet and the effect of VSWR on the ratings are presented. The electrical and design characteristics of the associated Subminax R.F. connectors used with the various coaxial cables are discussed with a presentation of data on the standard Subminax connectors which were used in this investigation. (Author)
AD-656 520 HC$3.00 MF$0.65

NEW DEVELOPMENTS IN CABLE JACKETING COMPOUNDS,
Bakelite Co New York
For primary bibliographic entry see Field 11I.
AD-656 521 HC$3.00 MF$0.65

NYLON IN WIRE AND CABLE,
Du Pont de Nemours (E I) and Co Wilmington Del Polychemicals Dept
For primary bibliographic entry see Field 11I.
AD-656 522 HC$3.00 MF$0.65

HIGH SPEED COLOR CODING OF PVC INSULATED WIRE,
Western Electric Co Inc Baltimore Md
W. L. Hoff. 1967, 15p

Descriptors: (*Plastic coatings, Colors), (*Electric wire, Plastic coatings), Electric insulation, Polyvinyl chloride, Machines, Identification.

A machine was developed for the high speed color coding of plastic insulated wire. Many codes can be produced since the rims can be drilled to yield any desired combination of dots and dashes at specified intervals along the wire. This device in conjunction with the great variety of colors of plastics and inks available makes it possible to produce 'All Plastic' cables with hundreds of conductors that can be identified and connected to their corresponding terminals. (Author)
AD-656 524 HC$3.00 MF$0.65

NEW IMPROVED POLYOLEFIN WIRE AND CABLE RESINS,
Phillips Petroleum Co Bartlesville Okla
For primary bibliographic entry see Field 11I.
AD-656 525 HC$3.00 MF$0.65

THE USE OF HEAT SHRINKABLE SILICONE RUBBER ON CABLES AND CABLE ASSEMBLIES,
Dow Corning Corp Midland Mich
G. L. Wehmueller, D. E. Weyer, and M. Nakonechny. 1964, 13p
Annual Wire and Cable Symposium, 2-4 December, 1964.

Descriptors: (*Electric cables, Electric insulation), (*Electric insulation, *Silicone plastics), Shrinkage, Costs, Reliability, Elastomers, Mechanical properties.

In recent years, a new concept in electrical insulating materials has been introduced to the wire and cable industry. This concept incorporated into several of the common insulating materials a heat actuated shrinking phenomenon. This phenomenon permits the insulation to be easily positioned into place and still obtain the required tight fit by heating it. The advantages to this technique of insulation include both time and cost savings, high reliability, and high quality workmanship and simplicity of application. First in the line of heat recoverable products to appear were plastics such as polyolefins, polyvinyl chloride, Teflon, and polyvinylidene chloride. Although these materials have performed satisfactorily in many applications, they lack flexibility and resistance to many of the environmental extremes that are frequently encountered in electrical insulation applications. To fill this need, the newest of the heat shrinkable products has been developed from an all silicone base. Unlike these plastics, the heat recoverable silicone rubber is an elastomeric material that is highly flexible and maintains this property over a broad temperature range. (Author)
AD-656 526 HC$3.00 MF$0.65

SOLID STATE RESEARCH, 1967-2.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 20L.
AD-656 548 HC$3.00 MF$0.65

CYCLOTRON ECHOES IN PLASMAS.
Lockheed Missiles and Space Co Palo Alto Calif
Lockheed Palo Alto Research Lab
For primary bibliographic entry see Field 20I.
AD-656 555 Not available from CFSTI

SOME ASPECTS OF THE STABILIZATION OF VINYL INSULATION,
National Lead Co Brooklyn N Y Research Labs
For primary bibliographic entry see Field 11I.
AD-656 610 HC$3.00 MF$0.65

TRANSVERSE-WAVE HIGH-POWER TUBE.
Quarterly rept. no. 1, 1 Jan-31 Mar 67,
Zenith Radio Research Corp Menlo Park Calif
C. Burton Crumly, and Roy A. Larsen. Jun 67, 21p Rept no. 6
ECOM-0226-1
Contract DAAB07-67-C-0226

Descriptors: (*Traveling-wave tubes, *Power amplifiers), Voltage, Attenuators, Deposition, Carbon, Synchronization (Electronics), Efficiency, Velocity, Modulation.

Research and development work is described on a traveling-wave power amplifier tube employing transverse-wave interaction between the negative synchronous wave and a circuit wave on a balanced structure. The theoretical advantage in this arrangement is the possibility of high-power amplification with high overall efficiency, due to the lack of longitudinal or transverse velocity modulation in the spent beam. Important aspects of output power and gun design are reviewed. Attenuator studies are detailed along with fabrication techniques and test results. All component parts have been completed and assembly of the first tube has begun. (Author)
AD-656 624 HC$3.00 MF$0.65

NOISE IN DOUBLE-INJECTION SPACE-CHARGE-LIMITED DIODES.
Revised ed.,
Minnesota Univ Minneapolis Dept of Electrical Engineering
S. T. Liu, S. Yamamoto, and A. van der Ziel. 3 May 67, 4p
AROD-5117:8
Contract DA-31-124-ARO (D)-291
Revision of manuscript submitted 12 Apr 67.
Availability: Published in Applied Physics Letters v10 n11 p308-9 Jun 1 1967.

Descriptors: (*Diodes (Semiconductor), Noise), Germanium, Transients, Thermal properties, Electrical conductance, High frequency, Electric currents.
Identifiers: Thermal noise.

It is shown that the h.f. conductance g of a double-injection Ge diode shows transit time effects and

that the limiting noise can be represented by a current generator (4kTg (Delta f)exp. 1/2 in parallel to the device. In contrast, the single-injection diode seems to be best represented by a current generator (8kTg (Delta f)exp. 1/2. (Author)
AD-656 663 Not available from CFSTI.

THE DETERMINATION OF PERIODIC MODES IN RELAY SYSTEMS USING THE STATE SPACE APPROACH,
New Brunswick Univ Fredericton Dept of Electrical Engineering
J. K. C. Chung, and D. P. Atherton. 9 Dec 65, 34p
Grant DRB-4003-05
Availability: Published in Int. J. Control, v4 n2 p105-26 1966.

Descriptors: (*Electric relays, *Mathematical analysis), Integral transforms, Feedback, Oscillation, Digital computers, Algebra, Equations, Switching circuits.

A method for determining the exact mode of oscillation of a time-invariant feedback system containing relays is presented. This method is based on the state space approach in the real time domain, and results in a set of transcendental algebraic equations which can easily be solved by digital computation. General state transition and control matrices for plants with n poles and m zeros are derived. For complicated plant characteristics, the switching equations can be obtained easily be simple superposition of the switching equations of 'elementary plants'. The general expression is given in discrete form, and may be reduced to a continuous form when no impulse control is present, otherwise a combined form is used. Switching equations for elementary plants up to third order are listed for reference, and illustrative examples are given with results compared by analogue simulation.
AD-656 677 Not available from CFSTI.

RADIATION STUDY ON MOS STRUCTURES,
Fairchild Camera and Instrument Corp Mountain View Calif Fairchild Semiconductor Div
For primary bibliographic entry see Field 20L.
AD-656 678 HC$3.00 MF$0.65

AXISYMMETRIC MODES IN HYDROMAGNETIC WAVEGUIDE.
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 20I.
AD-656 720 HC$3.00 MF$0.65

HIGH-EFFICIENCY TRANSISTOR CW RF POWER AMPLIFIER.
Army Electronics Command Fort Monmouth N J
For primary bibliographic entry see Field 9E.
AD-656 740 HC$3.00 MF$0.65

FABRICATION OF SEMICONDUCTOR DEVICES BY NEUTRON TRANSMUTATION DOPING.
Fundamental Methods Associates, Inc., New York.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 15.
NYO-3124-2 HC$3.00 MF$0.65

PROCEEDINGS OF SECOND NASA MICROELECTRONICS SYMPOSIUM.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
Jun 67, 557p NASA-TM-X-55834, X-722-67-252
Symp. Held At Greenbelt, Md., 19-22 Sep. 1966

Descriptors: *Conference, *Microelectronics, *Nasa program, Administration, Aeronautics, Circuit, Control, Device, Electronic, Equipment, Fabrication, Ferrimagnetic, Handling, Instrumentation, Integration, Manufacture, Material, Microminiaturization, Nation, Packaging, Quality, Rocket, Satellite, Semiconductor, Space, Spacecraft, Test, Transistor, Tunnel, Wind.

For abstract, see STAR 05 18.
N67-31562 HC$3.00 MF$0.65

DESIGN AND DEVELOP FAST SCAN INFRARED DETECTION AND MEASURING INSTRUMENT. PHASE IV - EXPERIMENTAL STUDY,
Raytheon Co., Wayland, Mass. Advanced Development Lab.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 05 18.
N67-31723 HC$3.00 MF$0.65

SPACE RADIATION EQUIVALENCE FOR EFFECTS ON TRANSISTORS FINAL REPORT, 15 MAY 1965 - 15 NOV. 1966.
Boeing Co., Seattle, Wash.
R. R. Brown, and W. E. Horne. 4 Aug 67, 322p
NASA-CR-814, D2-84088-2
Contract NAS5-9578

Descriptors: *Electron radiation, *Gamma radiation, *Proton irradiation, *Radiation effect, *Silicon transistor, *Space radiation, Cobalt 60, Damage, Displacement, Effect, Electron, Energy, Equivalence, Gamma, Irradiation, Parameter, Proton, Radiation, Silicon, Space, Transistor.

For abstract, see STAR 05 18.
N67-32026 HC$3.00 MF$0.65

9B. Computers

ALGORITHM FOR NONLINEAR PROGRAMMING: RESOURCE-ALLOCATION METHODOLOGY,
Research Analysis Corp., Bethesda, Md.
Anthony V. Fiacco, and Garth P. McCormick.
Nov 63, 21p TP-180
Contract DA-44-188-ARO-1

Descriptors: (*Programming (Computers), Optimization), Operations research, Mathematical models, Nonlinear programming, Dynamic programming.
Identifiers: Allocation processes, Resources, SCOOP Project.

Optimal allocation of limited resources can be expressed as a mathematical programming problem when optimization is defined as the maximization (minimization) of a specified output function, subject to the resource limitations. The paper describes a method for solving a large class of nonlinear programming problems: i. e., resource-allocations problems where one or more of the constraints or the objective function is a nonlinear function of the involved variables. (Author)
AD-428 288 HC$3.00

GEOPS.
Army Engineer Geodesy Intelligence and Mapping Research and Development Agency Fort Belvoir Va
For primary bibliographic entry see Field 8E.
AD-655 852 HC$3.00 MF$0.65

PLAN FOR DETECTION OF PARALLELISM IN COMPUTER PROGRAMS.
Quarterly progress rept. no. 3, 21 Jan-21 Apr 67, Burroughs Corp Paoli Pa Defense Space and Special Systems Group
Harvey W. Bingham, David A. Fisher, and John W. Seward. Jun 67, 28p Rept no. TR-67-3
ECOM-02463-3
Contract DA-28-043-AMC-02463 (E)

Descriptors: (*Compilers, Programming languages), (*Computer programs, Compilers), Iterative methods, Algorithms.
Identifiers: Multiprocessing, Multiprogramming, Algol.

This is the third report of an investigation to determine how implicit parallelism in programs written in compiler languages can be recognized and exploited by machines with highly parallel organizations. The algorithm developed in the two prior reports for detecting the essential order among program parts based upon in,ut-output set intersections and any initially known essential ordering has been applied in this report to loop and array structures. Although parallelism in many array references can be detected, run-time index determination limits the general recognition of array element parallelism. The effects of data structures on parallelism are related to machine organization and memory accessing. The block diagram of a parallelism detection program is given and the source language for programs to be analyzed is described. This program will be used as a tool for the demonstration of the desirability and feasibility for automatic recognition of parallelism in compiler language programs. Levels of program partitioning are discussed. A method for identifying the different instances of a variable during a program and their candidacy as inputs for subsequent references is described. (Author)
AD-655 867 HC$3.00 MF$0.65

TECHNIQUE FOR THE AUTOMATIC GENERATION OF BIBLIOGRAPHIES (A BIOMEDICAL INFORMATION APPLICATION),
General Dynamics/Convair San Diego Calif
For primary bibliographic entry see Field 6E.
AD-655 925 HC$3.00 MF$0.65

COMPUTER EXPERIMENTS ON LOW DENSITY CROSSED-FIELD ELECTRON BEAMS.
Research rept.,
Avco Everett Research Lab Everett Mass
R. H. Levy, and R. W. Hockney. Jun 67, 30p
Rept no. AERL-RR-273
Contracts AF 49 (638)-1553, NAS8-20310

Descriptors: (*Computers, *Crossed field devices), Electron beams, Theory, Magnetic fields, Density, Stability, Electric fields, Partial differential equations, Equations of motion.

The motions of thin and thick low density (q = omega subscript p 2/omega subscript c 2 much smaller than 1) crossed-field electron beams have been studied on the computer. Theoretical indications that such beams can be stable or unstable depending on the geometrical and electrical arrangements are supported, and the large amplitude behavior of a typical unstable configuration is found. In particular, thick, re-entrant beams can be quite stable against perturbations of the diocotron type. (Author)
AD-655 932 HC$3.00 MF$0.65

A COMPUTER-LINKED RUNWAY FOR REAL TIME OPERATION,
Western Australia Univ Nedlands Dept of Psychology
For primary bibliographic entry see Field 5J.
AD-655 978 Not available from CFSTI.

SOME ASPECTS OF PATTERN RECOGNITION BY COMPUTER.
Master's thesis,
Massachusetts Inst of Tech Cambridge
Adolfo Guzman-Arenas. Feb 67, 127p Rept no. MAC-TR-37
Contract Nonr-4102 (01)

Descriptors: (*Pattern recognition, Computers), Coding, Theses, Models (Simulations), Real time,

Time sharing, Computer programs, Geometric forms.
Identifiers: On-line systems, CONVERT, Polybrick.

A computer may gather a lot of information from its environment in an optical or graphical manner, if a TV picture of a scene is transformed into a symbolic description of points and lines, or surfaces. This thesis describes several programs, written in the language CONVERT, for analyzing such descriptions in order to recognize, differentiate, and identify desired objects or classes of objects in a scene. Examples are given in each case. Important restrictions and suppositions are: (a) input is assumed perfect (noiseless) and in a symbolic format; (b) no perspective deformation is considered. A portion of this thesis is devoted to the study of models (symbolic representations) of the objects we want to identify, and different schemes, some of them already in use, are discussed. Focusing attention on the more general problem of identifying general objects when they substantially overlap, some schemes are proposed for such recognition, and some concurrent problems are analyzed. (Author)
AD-656 041 HC$3.00 MF$0.65

QUARTERLY TECHNICAL PROGRESS REPORT, OCTOBER, NOVEMBER, DECEMBER 1966.
Illinois Univ Urbana Dept of Computer Science
Dec 66, 217p Rept no. COO-1469-0064
See also AD-631 991.

Descriptors: (*Computers, Scientific research), Circuits, Coding, Photoconductivity, Electroluminescence, Time sharing, Display systems, Reliability, Partial differential equations, Linear programming, Algorithms, Real time, Numerical methods and procedures, Performance (Engineering), Computer logic.

Contents: Circuit research program; Hardware systems research; Computer system software research; ILLIAC IV; Numerical methods, computer arithmetic and artificial languages; ILLIAC II service use; IBM service, use, and program development; Problem specifications; Switching theory and logical design; General laboratory information.
AD-656 050 HC$3.00 MF$0.65

AN IMAGE RESTORATION EXPERIMENT ON TURBULENCE-DEGRADED IMAGES,
Scripps Institution of Oceanography San Diego Calif Visibility Lab
For primary bibliographic entry see Field 14E.
AD-656 124 HC$3.00 MF$0.65

PROGRAMMING BY QUESTIONNAIRE: THE JOB SHOP SIMULATION PROGRAM GENERATOR,
Rand Corp Santa Monica Calif
Paula M. Oldfather, Allen S. Ginsberg, Patricia L. Love, and Harry M. Markowitz. Jul 67, 112p Rept no. RM-5162-PR
Contract F44620-67-C-0045
Availability: Published in Copyrighted Journal.

Descriptors: (*Programming (Computers), Questionnaires), (*Models (Simulations), Digital computers), Computer programs, Costs, Subroutines, Queueing theory, Probability, Management planning, Job analysis.
Identifiers: Job shop simulation program generator, SIMSCRIPT.

Programming by Questionnaire, or the Program Generator technique, is a method by which many computer programs can be produced at considerable savings of time, effort, and cost. The present Memorandum presents the first application of the technique, the Job Shop Simulation Program Generator (JSSPG). The user is introduced to the JSSPG by means of a simple generated program. The completion of the questionnaire and the preparation of the data for the program's execution are discussed step by step. The results of executing the simple model are included in a later section. For the user who wishes to obtain a general feeling for the types of programs available through the JSSPG, the example should suffice. For those users who want to use the JSSPG to generate a job shop model, the questionnaire is discussed in detail. Instructions are also included for generating and executing programs, and analysis of the simulation results is discussed.
AD-656 296 Not available from CFSTI.

MIMIC PROGRAMMING MANUAL.
Technical rept.,
Systems Engineering Group Wright-Patterson AFB Ohio
Frederick J. Sansom, and Harry E. Petersen. Jul 67, 172p Rept no. SEG-TR-67-31

Descriptors: (*Differential equations, Computer programs), (*Programming (Computers), Instruction manuals), Digital computers, Simulation, Analog computers, Coding, Computer logic, Boundary value problems, Heat transfer, Subroutines.
Identifiers: MIMIC, MIDAS.

The report is intended to serve as a self-teaching and working manual for the MIMIC computer program that provides digital solutions on an IBM 7090 (7094) computer for systems of ordinary differential equations. MIMIC is the successor to MIDAS (Modified Integration Digital Analog Simulator). It is considerably more powerful, versatile and efficient while retaining the basic simplicity of its predecessor. The program is intended for a wide range of users, from the engineer with no prior knowledge of digital programming to the sophisticated digital programmer faced with the requirement for obtaining solutions to mathematical problems of this type. The manual contains complete instructions for reducing the given equations to MIMIC language, handling imput and output of data, and detailed explanations - profusely illustrated by examples - of the use of the basic MIMIC functions. Appendices contain a tabulation of all standard MIMIC functions in a compact summary form, five (5) completely solved sample problems, and a description of some aspects of the MIMIC processor.
AD-656 301 HC$3.00 MF$0.65

IMPACT OF THE COMPUTER ON JOB ANALYSIS IN THE UNITED STATES AIR FORCE,
Personnel Research Lab Lackland AFB Tex
For primary bibliographic entry see Field 5I.
AD-656 304 HC$3.00 MF$0.65

DATALESS PROGRAMMING,
Rand Corp Santa Monica Calif
R. M. Balzer. Jul 67, 50p Rept no. RM-5290-ARPA
Contract DAHC15-67-C-0141, ARPA Order-189-1

Descriptors: (*Programming languages, Computers), (*Programming (Computers), Data processing systems), Coding, Algorithms, Iterative methods, Algebra.
Identifiers: Dataless programming language.

This memorandum describes the preliminary specifications of the Dataless Programming Language, a high-level algebraic language which is an extension of PL/1 and uses its syntax (with some exceptions). Separate sections of the memorandum discuss: specifying hierarchical data references; maintaining the language's two types of pointers; defining individual members of a data collection; special features of the language; its restricted implementation; expected advantages and difficulties. A final section provides two Dataless Programming examples, with commentaries.
AD-656 449 HC$3.00 MF$0.65

APPLICATION OF NET-1 NETWORK ANALYSIS COMPUTER PROGRAM TO THE DC AND TRANSIENT ANALYSIS OF SWITCHING CIRCUITS.
Army Electronics Command Fort Monmouth N J
For primary bibliographic entry see Field 9E.
AD-656 458 HC$3.00 MF$0.65

DISPLAYTRAN - A GRAPHICAL DISPLAY ORIENTED CONVERSATIONAL FORTRAN FACILITY FOR AN IBM 360/40 COMPUTER.
Technical memo.,
Naval Weapons Lab Dahlgren Va
Anne B. Ammerman, Larry R. Diesen, and Hermon W. Thombs. Jul 67, 122p Rept no. NWL-TM-K-39/67

Descriptors: (*Programming (Computers), Data processing systems), Subroutines, Time sharing, Errors, Input-output devices, Programming languages, Man-machine systems, Control sequences, Display systems.
Identifiers: DISPLAYTRAN, On-line systems, IBM 360/40, FORTRAN IV.

The report describes an experimental time-shared system called DISPLAYTRAN. The DISPLAYTRAN system allows programmers to construct and debug FORTRAN IV programs in an on-line conversational manner. It provides immediate response to syntax errors and contains a host of source language debug aids to assist programmers in finding errors in program logic or semantics. Analysts will be able to communicate with application programs (prepared using the system) during their execution. Input to and output from application programs can be in a graphical and/or tabular form. DISPLAYTRAN is operational on an IBM 360/40 computer. This time-shared system drives one remote terminal and concurrently executes one background program. The remote terminal consists of an IBM 2250 display, a slow speed printer, and a function keyboard. A two terminal system is expected to be available during the fall of 1967. This manual provides the information necessary to use the DISPLAYTRAN system. It contains a description of the command language (user/system communication language), the FORTRAN IV language, and the hardware configuration of the system. (Author)
AD-656 583 HC$3.00 MF$0.65

CERAMIC MEMORY DEVICE,
Harry Diamond Labs Washington D C
C. W. H. Barnett. Jun 67, 34p Rept no. HDL-TR-1352

Descriptors: (*Computer storage devices, Design), (*Piezoelectric crystals, Computer storage devices), Coding, Polarization, Voltage, Manufacturing methods, Circuits, Hysteresis, Signals.

This is the first report describing HDL development on a ceramic peizoelectric memory. The device is in the form of a disc, 1 in. in diameter and 0.025 in. in thickness containing silver electrodes so placed that it operates as a piezoelectric motor-generator at its resonant frequency. Two stable states, permitting binary coding of information, are realized by utilizing the differing outputs resulting from the presence or absence of remnant polarization between the generator electrodes. It was concluded from voltage time experiments that a write-in voltage of about 1500 V dc applied for 3 sec will induce the 'one' condition (ca. 10 V peak-to-peak) and a subsequent write-in voltage of 1500 V dc of reverse polarity for 3 sec will induce the 'zero' condition (ca. 2-3 V peak-to-peak). The device retains the stored information after a period of time in the 'no-power' condition and the

readout is non-destructive. The device has isolated read and write electrodes and requires no internal mechanical switching in its connection to the timer circuits for which it will serve as a memory. (Author)
AD-656 598 HC$3.00 MF$0.65

SIZE EFFECTS IN THE TEMPERATURE VARIATION OF ELECTRICAL CONDUCTIVITY OF EPITAXIAL GOLD FILMS,
Illinois Univ Urbana Coordinated Science Lab
For primary bibliographic entry see Field 7D.
AD-656 609 HC$3.00 MF$0.65

ADVANCES IN THE USE OF COMPUTERS FOR HANDLING HUMAN FACTORS TASK DATA,
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 5E.
AD-656 701 HC$3.00 MF$0.65

SOVIET AUTOMATIC HYDROMETEOROLOGICAL NETWORK.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 4B.
AD-656 702 HC$3.00 MF$0.65

ELECTROLUMINESCENCE: AN APPRAISAL FOR AVIONIC DISPLAY APPLICATIONS.
Litton Systems Inc Woodland Hills Calif Guidance Systems Lab
For primary bibliographic entry see Field 20F.
AD-656 733 Not available from CFSTI.

ON ADAPTIVE NETS.
Bell Aerosystems Co Buffalo N Y
For primary bibliographic entry see Field 12B.
AD-656 764 HC$3.00 MF$0.65

FROM RESEARCH TO APPLICATION: A FOLLOW-UP EFFECTIVENESS STUDY OF GRANT AF-AFOSR-177-63, COMPUTER ANALYSIS AND SYNTHESIS OF ELECTRICAL CIRCUITS,
Air Force Office of Scientific Research Arlington Va
For primary bibliographic entry see Field 9E.
AD-656 768 HC$3.00 MF$0.65

THE BBN 940 LISP SYSTEM,
Bolt Beranek and Newman Inc Cambridge Mass
Daniel G. Bobrow, D. Lucille Darley, L. Peter Deutsch, Daniel L. Murphy, and Warren Teitelman. 15 Jul 67, 138p Rept no. Scientific-9, BBN-1539
AFCRL-67-0458
Contract AF 19 (628)-5065, ARPA Order-627

Descriptors: (*Programming languages, Computers), Computer storage devices, Artificial intelligence, Compilers, Subroutines, Time sharing, Data processing systems.
Identifiers: LISP, SDS 940 computer, List processing, On-line systems.

The report describes the LISP system implemented at BBN on the SDS 940 Computer. This LISP is an upward compatible extension of LISP 1.5 for the IBM 7090, with a number of new features which make it work well as an on-line language. These new features include tracing, and conditional breakpoints in functions for debugging and a sophisticated LISP oriented editor. The BBN 940 LISP SYSTEM has a large memory store (approximately 50,000 free words) utilizing special paging techniques for a drum to provide reasonable computation times. The system includes both an interpreter, a fully compatible compiler, and an assembly language facility for inserting machine code subroutines. (Author)
AD-656 771 HC$3.00 MF$0.65

APPLICATION OF COMPUTER FACILITIES FOR THE DETERMINATION OF SIZE DISTRIBUTION IN POLYMER LATICES.
Technical rept.,
Wayne State Univ., Detroit, Mich. Dept. of Chemistry.
Mukul Yajnik, Jack Witeczek, and Wilfried Heller.
1 Feb 67, 10p TR-15 (61)
Contract Nonr-3511 (00)

Descriptors: (*Computer programs, *Particle size), (*Polymers, Particle size), Statistical distributions, Computers, Differential equations, Bessel functions, Functions, Curve fitting, Scattering, Theory, Particles, Numerical methods and procedures, Errors, Distribution.

Fortran programs were developed to compute light scattering functions for hetero-disperse systems which can be described by a bi-parametric, unimodal, exponential distribution function. The programs had to include the evaluation of the Mie functions for angular scattering for any arbitrary values of the size parameter alpha. This involves the calculation of the Riccati-Bessel functions and Legendre polynomials. Several methods of numerical integration of the expressions containing the products of the Mie functions and the distribution function were investigated. Gaussian quadrature could yield the results of integration with better precision but its use required a considerable amount of machine time and thus it was adopted only for part of the results obtained. The simpler Simpson's rule allowed one to store the Mie functions needed in the integration, and as some of our studies have shown, its results come close (within the limits of experimental error of light scattering methods) to those obtained from the Gaussian method. The computer has also been used for fitting the experimentally obtained light scattering data with the theoretical ones. (Author)
AD-807 464 HC$3.00 MF$0.65

CROSS-FLOW MIXING BETWEEN PARALLEL FLOW CHANNELS DURING BOILING. PART I. COBRA COMPUTER PROGRAM FOR COOLANT BOILING IN ROD ARRAYS,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 15.
BNWL-371 PT. I HC$3.00 MF$0.65

THE 1107 MANUAL FOR PHYSICS CHAIN, A REACTOR ANALYSIS CODE,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 15.
BNWL-413 HC$3.00 MF$0.65

THE EFFECTS OF COOLANT TEMPERATURE AND INITIAL POWER LEVEL ON THE EXCURSION BEHAVIOR OF A HIGHLY ENRICHED PLATE CORE IN SPERT III EXPERIMENT AND ANALYSIS,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
C. M. Condit, J. F. Scott, and R. L. Johnson. Mar 67, 119p
Contract AT (10-1)-205

Descriptors: (*Reactor cores, *Reactor coolants), Temperature, Power, Reactor fuel plates, Reactor fuel enrichment.

For abstract, see NSA 21 15.
IDO-17138 HC$3.00 MF$0.65

TABLES OF PARA-HYDROGEN DATA IN ENGINEERING UNITS FROM 36 DEGREES TO 5000 DEGREES R AT PRESSURES TO 5000 PSIA,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 20M.
For abstract, see NSA 21 15.
LA-3669 HC$3.00 MF$0.65

DTF-BURN A MULTIGROUP TRANSPORT THEORY BURNUP PROGRAM WRITTEN IN FORTRAN-IV,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 18K.
For abstract, see NSA 21 15.
LA-3671 HC$3.00 MF$0.65

PEGRAM NUCLEAR PHYSICS LABORATORIES PROGRESS REPORT, JANUARY 1966-JANUARY 1967.
Columbia Univ., New York. Dept. of Physics.
For primary bibliographic entry see Field 18B.
For abstract, see NSA 21 15.
NYO-GEN-132 HC$3.00 MF$0.65

A GENERAL-PURPOSE ON-BOARD PROCESSOR FOR SCIENTIFIC SPACECRAFT.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
F. Styles, T. Taylor, M. Tharpe, and C. Trevathan. Jul 67, 29p NASA-TM-X-55843, X-562-67-202

Descriptors: *Component reliability, *Digital computer, *Spacecraft electronic equipment, Circuit, Component, Computer, Digital, Electronic, Engineering, Equipment, Flight, Grammar, Input, Integration, Language, Machine, Machine language, Memory, Model, Onboard, Output, Packaging, Processing, Reliability, Spacecraft, Storage.

For abstract, see STAR 05 18.
N67-31509 HC$3.00 MF$0.65

REPORT OF THE SESSION OF THE WGLR SUBCOMMITTEE ON AERODYNAMICAL COMPUTER TECHNOLOGY.
Wissenschaftliche Gesellschaft Fur Luft- Und Raumfahrt, Cologne (West Germany).
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 18.
N67-31881 HC$3.00 MF$0.65

CONTINUATION OF THEORETICAL AND EXPERIMENTAL RESEARCH ON DIGITAL ADAPTIVE CONTROL SYSTEM, 16 SEPTEMBER 1966 - 16 FEBRUARY 1967.
Emerson Electric Mfg. Co., St. Louis, Mo.
M. R. Chidambara, R. E. Janitch, R. G. Marsh, and J. Zaborszky. Jul 67, 181p NASA-CR-810, REPT.-2126
Contract NAS1-6669

Descriptors: *Adaptive control system, *Digital computer, *Linear system, *Nonlinear system, Adaptive, Computer, Control, Data, Digital, Interpolation, Inversion, Linear, Matrix, Nonlinear, Nonstationary, Plant, Simulation, Stationary, System, Theory, Time, Truncation, Variation, Volterra equation.

For abstract, see STAR 05 18.
N67-32096 HC$3.00 MF$0.65

ORMEF A FORTRAN CODE FOR COMPUTING DETAIL MULTI-EFFECT MULTI-STAGE FLASH EVAPORATION DESALINATION PLANT DESIGNS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 7A.
For abstract, see NSA 21 15.
ORNL-TM-1560 HC$3.00 MF$0.65

ELECTRONIC COMPUTER PROGRAM FOR FLOOD RECORD COMPILATION AND FREQUENCY PLOT,

Bureau of Public Roads, Washington, D. C. Office of Research and Development.
For primary bibliographic entry see Field 8H.
PB-175 511 HC$3.00 MF$0.65

A STUDY OF THE USE OF COMPUTERS.
Interim technical rept.,
Informatics, Inc., Bethesda, Md.
George O. Collins, Jr. Sep 66, 70p TR-66-679-1
Contract CST-313
See also PB-175 665, PB-175 666.

Descriptors: (*Computers, Remote control systems), (*Time sharing, State-of-the-art reviews), Input-output devices, Data processing systems, Questionnaires, Man-machine systems, Programming languages, Models (Simulations).
Identifiers: On-line systems.

A survey was made of more than 200 computer installations which were using the central processor capability through remote terminals. Techniques of the survey are described. Results of the responses are analyzed and discussed. Printouts of the response data are included in a separately bound Appendix. (Author)
PB-175 664 HC$3.00 MF$0.65

A STUDY OF THE REMOTE USE OF COMPUTERS.
Interim technical documentary rept.,
Informatics, Inc., Bethesda, Md.
George O. Collins, Jr. Dec 66, 204p TR-66-679-2
Contract CST-313
See also PB-175 664, PB-175 666.

Descriptors: (*Computers, Remote control systems), (*Time sharing, State-of-the-art reviews), Data processing systems, Programming languages, Man-machine systems, Input-output devices, Display systems, Reliability, Subroutines, Data storage systems, Compilers, Scheduling.
Identifiers: On-line systems, Light pens, Multiprocessing.

Four computer systems with remote consoles were selected and studied in depth. The report consists of case study descriptions of the history, hardware, software and user experience of these four systems. The four systems selected were: (1) SDS 940 Time-Sharing System; (2) GE/Dartmouth BASIC System; (3) IBM Administrative Terminal System (ATS); (4) General Motors Research Laboratories Computer Graphics System (DAC-1).
PB-175 665 HC$3.00 MF$0.65

A STUDY OF THE REMOTE USE OF COMPUTERS.
Final rept.,
Informatics, Inc., Bethesda, Md.
George O. Collins, Jr. Jan 67, 108p TR-67-679-1-F
Contract CST-313
See also PB-175 664, PB-175 665.

Descriptors: (*Computers, Remote control systems), (*Time sharing, State-of-the-art reviews), Data processing systems, Standardization, Questionnaires, Programming languages, Man-machine systems, Computer logic, Reliability, Compilers, Scheduling, Input-output devices, Display systems, Data storage systems.
Identifiers: Multiprogramming, On-line systems.

The study of the remote use of computers described in this report was divided into three phases. In Phase 1, a survey was made of more than 200 computer installations which were using the central processor capability through remote terminals. Techniques of the survey are described and the response data are summarized. In Phase 2, four computer systems selected from those surveyed were studied in depth. Detailed case studied on these systems were prepared. The final phase was devoted to analysis of data and information collected on remote computer systems with greater emphasis being given to time-shared systems. A picture of the current state of the art is presented with recommendations for areas where further work needs to be done and areas where standardization is needed or desirable. (Author)
PB-175 666 HC$3.00 MF$0.65

FEASIBILITY OF COMPUTER STORAGE AND RETRIEVAL OF FREIGHT TARIFF INFORMATION, PHASE II.
Battelle Memorial Inst., Columbus, Ohio. Columbus Labs.
For primary bibliographic entry see Field 5C.
PB-175 706 HC$3.00 MF$0.65

APPLICATIONS AND OPTIMIZATION OF THE LITHIUMDRIFTED GERMANIUM DETECTOR SYSTEM,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 15.
UCRL-50156 HC$3.00 MF$0.65

FORTRAN PROGRAM (TEMCAL) FOR CALCULATION OF HUGONIOT TEMPERATURES, ISOTHERMS, AND RELEASE ADIABATS FROM HYDRODYNAMIC DATA,
California Univ., Livermore. Lawrence Radiation Lab.
Franklin E. Walker. 27 Mar 67, 30p
Contract W-7405-eng-48

Descriptors: (*Programming languages, Input-output devices), Least squares method, Data, Equations.

For abstract, see NSA 21 15.
UCRL-50210 HC$3.00 MF$0.65

PUBLISHABLE GRAPHS BY COMPUTER A FLEXIBLE, EASY-TO-USE PROGRAM FOR THE CALCOMP PLOTTER,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 12A.
For abstract, see NSA 21 15.
UCRL-50250 HC$3.00 MF$0.65

CORRECTING FORM ERRORS IN NUMERICALLY CONTROLLED MACHINED, POINT-DEFINED, SURFACES OF REVOLUTION,
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
For primary bibliographic entry see Field 13H.
For abstract, see NSA 21 15.
Y-1576 HC$3.00 MF$0.65

9C. Electrical and Electronic Engineering

ECONOMIC DECISION CRITERIA FOR REPAIR VERSUS THROWAWAY MAINTENANCE.
Vitro Labs., Silver Spring, Md.
For primary bibliographic entry see Field 15E.
AD-455 102 HC$3.00

ORDNANCE ENGINEERING DESIGN HANDBOOK: SERVOMECHANISMS. SECTION 2: MEASUREMENT AND SIGNAL CONVERTERS, CONSISTING OF CHAPTERS 11-12.
Office of the Chief of Ordnance Washington D C
For primary bibliographic entry see Field 19D.
AD-655 862 HC$3.00 MF$0.65

RELIABILITY AND OPTIMUM DESIGN OF THE INTERCONNECTIONS OF A POWER SYSTEM.
Revised ed.,
Northeastern Univ Boston Mass Dept of Electrical Engineering
H. Frank, and S. L. Hakimi. 15 Nov 65, 7p
AFOSR-67-1702
Grant AF-AFOSR-98-65
Prepared in cooperation with California Univ., Berkeley. Dept. of Electrical Engineering. Revision of manuscript received 13 Aug 65. Prepared for presentation at IEEE Winter Power Meeting, New York, N. Y. 13 Aug 65.
Availability: Published in IEEE Transactions on Power Apparatus and Systems vPas-85 n12 p1191-5 Dec 1965.

Descriptors: (*Transmission lines, Reliability), Electrical networks, Optimization, Mathematical models, Power, Circuit interconnections, Design, Linear programming.

A power system is assumed to be a communication network where interconnecting lines are information channels and current flow is equivalent to information flow. Given a set of power stations and cities with current demands, the interconnecting (lossless) links may be unreliable. Techniques to compute the probability of satisfying the power demands and methods of increasing this probability are discussed. In realtity, there is a cost associated with sending a flow through a given line. A synthesis procedure, based on linear programming, to design a minimum cost distribution system which satisfies the given power demands is presented. Various extensions and generalizations of the problem are also given. (Author)
AD-655 962 Not available from CFSTI.

ENGINEERING AND MATERIAL CONSIDERATIONS IN BURIED PLANT,
Rural Electrification Administration Washington D C
For primary bibliographic entry see Field 9A.
AD-656 072 HC$3.00 MF$0.65

AN ADAPTER TO IMPROVE THE SENSITIVITY OF THE Q METER FOR DIELECTRIC LOSS MEASUREMENTS OF POLYETHYLENE,
Union Carbide Corp New York Plastics Div
For primary bibliographic entry see Field 14B.
AD-656 201 HC$3.00 MF$0.65

THE EFFECTS OF SOIL MICROORGANISMS ON THE PHYSICAL AND ELECTRICAL CHARACTERISTICS OF RADIO FREQUENCY CABLES,
Signal Corps Engineering Labs Fort Monmouth N J
For primary bibliographic entry see Field 11I.
AD-656 255 HC$3.00 MF$0.65

ENGINEERING POLYETHYLENE FOR WIRE AND CABLE,
Du Pont de Nemours (E I) and Co Wilmington Del Polychemicals Dept
For primary bibliographic entry see Field 11I.
AD-656 260 HC$3.00 MF$0.65

INFLUENCE OF WATER IMMERSION ON ELECTRICAL CHARACTERISTICS OF SILICONE RUBBER,
Simplex Wire and Cable Co Cambridge Mass
For primary bibliographic entry see Field 11J.
AD-656 285 HC$3.00 MF$0.65

TEXAS BIANNUAL OF ELECTRONICS RESEARCH, NO. 5.
Summary rept. 1 Oct 66-31 Mar 67,

Texas Univ Austin Labs for Electronics and Related Science Research
Arwin A. Dougal. 15 May 67, 238p
AFOSR-67-1115
Grant AF-AFOSR-76[illegible]

Descriptors: (*Electronics, Symposia), Information retrieval, Quantum mechanics, Plasma physics, Classification, Space flight, Boundary value problems, Magnetic fields, Terrestrial magnetism, Radar, Semiconductors, Lasers, Cyclotrons, Electromagnetic waves, Pattern recognition, Transducers, Antennas, Interferometers, Bionics.

Recent findings, research investigations in progress, and future plans in the areas of biomedical electronics; information systems, physical, quantum, and plasma electronics; and space, atmospheric, and earth radio sciences are presented. This fifth biannual is highlighted by definitive new results recently obtained in several of these areas. A new numerical classification procedure was applied to a group of psychiatric patients. The procedure yielded a seventy percent agreement with independent clinical diagnosis and indicates that relatively distinct groups exist for the stated diagnostic categories. Experimentation in progress related to the development of mechanized systems for the recognition of spoken English and the recognition of hand printed letters and numbers is summarized. A new feature extraction criterion is found to be mathematically tractable, easier to apply than the minimum probability of misclassification criterion, and to be relevant in learning and pattern recognition. An investigation of field-effect transistor models for use in the Electronic Circuit Analysis Program has been completed and found to give a reasonable simulation of the actual behavior of a pulse inverter circuit. A simple criterion is derived for upper-bounding the rate of convergence of a least square fit algorithm used for recovering function from noisy measurements taken at randomly selected points. Experiments on a nonohmic current which occurs in thin films of silicon-nitride at high fields are interpreted to attribute the current to a combination of Poole-Frenkel emission, and tunneling.
AD-656 349 HC$3.00 MF$0.65

AN EXPERIMENT IN BASIC AIRBORNE ELECTRONICS TRAINING. PART II. EFFECT OF REDUCTION IN TRAINING TIME UPON KNOWLEDGE OF RADAR MAINTENANCE.
Naval Personnel Research Activity San Diego Calif
For primary bibliographic entry see Field 5J.
AD-656 436 HC$3.00 MF$0.65

PERSONNEL IMPLICATIONS OF NEW TECHNOLOGICAL DEVELOPMENTS, MICROELECTRONICS AND AUTOMATION.
Research memo.,
Naval Personnel Research Activity San Diego Calif
David A. Wilson. Jun 67, 58p Rept no. NPRA-SRM-67-29

Descriptors: (*Management planning, *State-of-the-art reviews), (*Naval personnel, Naval training), Predictions, Automation, Electronics, Microminiaturization (Electronics), Logistics, Spare parts.

The purpose of this exploratory investigation is to develop and employ valid bases in forecasting the most likely effects of new technology on future Navy personnel and training requirements. This report emphasizes long-range personnel implications of the introduction of microelectronics and attendant automation into the Fleet. The research is not directed at developing a personnel plan, but at providing the Navy with a tool of long range personnel planning. Content is based on a review of evidence previously developed, interviews with numerous scientists, technicians, and planners, both in and out of the military establishment, and a study of representative current technical and policy documentation. This report forecasts that the initial introduction of 'first generation' microelectronic equipment will temporarily increase the variety of spares in the logistics pipeline and impose additional training requirements on those technicians responsible for its maintenance. It is further predicted that large-scale integration of microelectronic circuits will supersede 'first-generation' microcircuitry during the mid-1970s, which will result in the gradual elimination of traditional shipboard trouble-shooting and repair of electronic equipments entering the development cycle during the late 1970s. Through gradual realization of very high inherent reliability, large scale circuit integration, and automated self-testing, substantial reductions in the logistics support requirements, and the numbers, skill levels, and training requirements of electronics technicians are forecast for the late 1970s and early 1980s. (Author)
AD-656 452 HC$3.00 MF$0.65

VALUE ENGINEERING QUARTERLY REPORT FOR LIGHT OBSERVATION HELICOPTER AVIONICS PACKAGE.
Sylvania Electronic Systems-Central Williamsville N Y
For primary bibliographic entry see Field 1C.
AD-656 477 HC$3.00 MF$0.65

IMPROVED POLYVINYL CHLORIDE INSULATION FOR 105C SERVICE,
Goodrich (B F) Chemical Co Cleveland Ohio
For primary bibliographic entry see Field 11I.
AD-656 499 HC$3.00 MF$0.65

THE USE OF IRRATHENE IRRADIATED POLYETHYLENE IN WIRE AND CABLE,
General Electric Co Pittsfield Mass Chemical Development Dept
For primary bibliographic entry see Field 11I.
AD-656 512 HC$3.00 MF$0.65

TIME DOMAIN ANALYSIS OF IMPULSE RESPONSE TRAINS.
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 9D.
AD-656 611 HC$3.00 MF$0.65

RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Progress rept. no. 15, 1 Nov 66-30 Apr 67,
Columbia Radiation Lab New York
R. Novick. 30 Apr 67, 115p
Contract DA-28-043-AMC-00099 (E)
Continuation of Contract DA-36-039-sc-90789.
See also AD-646 898.

Descriptors: (*Microwaves, Scientific research), (*Atomic spectroscopy, Microwave frequency), (*Molecular spectroscopy, Microwave frequency), (*Solid state physics, Microwaves), (*Radio astronomy, Microwaves), Atomic energy levels, Helium, Alkali metals, Hyperfine structure, Microwave spectroscopy, Fluorescence, Atomic clocks, Molecular beams, Masers, Molecular energy levels, Lasers, Nuclear magnetic resonance, Planetary atmospheres, Atmosphere models, X rays, Telescopes.
Identifiers: X-ray astronomy.

Contents: Metastable atoms and ions; Level-crossing and optical double-resonance spectroscopy; Collision phenomena; Atomic frequency standards; Beam maser spectroscopy; Electron excitation of molecular hydrogen; Scattering of velocity selected molecular beams; Magnetic rotation spectra; Molecular spectra of cesium; Laser studies of molecular birefringence and optical activity; Optical laser spectroscopy of fluids; Interaction between a neutral beam and a conducting surface; Adiabatic demagnetization in the rotating frame; Nuclear magnetic resonance in fine particles; Nuclear double resonance in KC1O3; Photon-echo resonance; Brillouin scattering; Models of planetary atmospheres; X-ray polarization; X-ray telescope.
AD-656 618 HC$3.00 MF$0.65

FM TAPE RECORDER FREQUENCY ALIGNMENT UNIT,
Naval Ordnance Lab White Oak Md
For primary bibliographic entry see Field 14B.
AD-656 722 HC$3.00 MF$0.65

ELECTROLUMINESCENCE: AN APPRAISAL FOR AVIONIC DISPLAY APPLICATIONS.
Litton Systems Inc Woodland Hills Calif Guidance Systems Lab
For primary bibliographic entry see Field 20F.
AD-656 733 Not available from CFSTI.

THE ADMITTANCE OF THE INFINITE CYLINDRICAL ANTENNA IN A LOSSY, ISOTROPIC, COMPRESSIBLE PLASMA.
Michigan Univ., Ann Arbor. High Altitude Engineering Lab.
E. K. Miller. Mar 67, 88p NASA-CR-86619, REPT.-05627-10-S
Contract NASR-54/05/

Descriptors: *Dipole antenna, *Numerical analysis, *Plasma density, Admittance, Analysis, Antenna, Collision, Current, Cylinder, Density, Dipole, Electron, Equation, Frequency, Gap, Impedance, Infinite, Ionosphere, Isotropic, Linear, Maxwell equation, Numerical, Plasma, Resonance, Sheath, Vacuum, Voltage.

For abstract, see STAR 05 18.
N67-31519 HC$3.00 MF$0.65

THEORY OF CURRENTS AND VOLTAGES OF A RECTIFIER OR INVERTER CONNECTED TO A SYNCHRONOUS MACHINE.
Zurich Univ. (Switzerland). Swiss Federal Inst. of Technology.
For primary bibliographic entry see Field 20C.
For abstract, see STAR 05 18.
N67-31875 HC$3.00 MF$0.65

THE DEVELOPMENT OF A MICROMINIATURE DC SIGNAL CONDITIONING AMPLIFIER.
National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
G. E. Wenzel. Jul 67, 61p NASA-TN-D-4091

Descriptors: *Chopper, *Integrated circuit, *Microminiaturization, Circuit, Conditioning, Coupling, Current, Design, Development, Direct, Integration, Signal, System.

For abstract, see STAR 05 18.
N67-31986 HC$3.00 MF$0.65

REFLECTION MEASUREMENTS IN TRANSMISSION TECHNOLOGY USING BROADBAND FREQUENCY MODULATION IN THE MICROWAVE REGION.
Eidgenossische Technische Hochschule, Zurich (Switzerland).
For primary bibliographic entry see Field 20N.
For abstract, see STAR 05 18.
N67-32030 HC$3.00 MF$0.65

CRUFT LABORATORY SEMIANNUAL PROGRESS REPORT, 1 JUL. - 31 DEC. 1966.
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
Mar 67, 89p NASA-CR-85887, SAPR-73
Grant NSG-579, Contract NGR-22-007-056

Descriptors: *Automatic control, *Communication theory, *Electromagnetic wave, *Ferromagnetism, *Signal transmission, *Very low frequency, Amplitude, Automatic, Brillouin effect, Communication, Control, Electron, Frequency, Laser, Material, Measurement, Modulation, Network, Physics, Plot, Pulse, Raman effect, Relaxation, Semiconductor, Signal, Solid, State, Theory, Transmission, Very low.

For abstract, see STAR 05 18.
N67-32215 HC$3.00 MF$0.65

ELECTRONIC POSITIONING SYSTEMS FOR SURVEYORS.
Coast and Geodetic Survey, Rockville, Md. Engineering Div.
For primary bibliographic entry see Field 8E.
PB-175 604 HC$3.00 MF$0.65

OVERCURRENT PROTECTION IN ELECTRONIC CIRCUITS,
Kitt Peak National Observatory, Tucson, Ariz.
Donald E. Trumbo. 1967, 3p
Prepared in cooperation with National Science Foundation, Washington, D. C.

Descriptors: (*Instrumentation, Electric currents), Circuits, Magnetic cores, Magnetic properties, Voltage, Reliability (Electronics), Silicon controlled rectifiers, Thyratrons, Circuit breakers, Fuses (Electrical).
Identifiers: Overload protection.

The purpose of this invention is to provide simple fast acting overload or overcurrent protection for a wide variety of instruments. This device consists of three parts. The sensing core is a toroid of magnetic material possessing a very square hysteresis loop. The core is held in saturation by a bias winding. This current is chosen so that normal circuit currents do not unsaturate the core. When an overcurrent condition occurs, that is when the magnetizing force due to circuit current exceeds the bias magnetizing force by the coercive force for the particular core used, the core comes out of saturation and any further change in circuit current will cause a voltage to be induced in the sense winding. This trigger voltage then trips a fast acting low impedance switch such as a silicon controlled rectifier or a thyratron. This reduces the supply voltage to the operating circuit to a value low enough to prevent damage. The very high current that flows through the fast switch also flows through the slow acting circuit breaker or fuse. This will finally open the circuit until the fault can be located.
PB-175 614 HC$3.00 MF$0.65

RADAR TEST SET AN/UPM-70 AN/UPM-70A.
Technical manual instrument calibration procedure GQ-17.
Bureau of Naval Personnel Representative, Pomona, Calif. Metrology Engineering Center.
15 Jun 67, 39p
NAVAIR-17-20GZ-17

Descriptors: (*Calibration, *Test sets), Instruction manuals, Test equipment (Electronics), Test methods, Oscilloscopes.

The procedure describes the calibration of the AN/UPM-70 or AN/UPM-70A Radar Test Set, consisting of two basic units, the OS-56/UPM-70 or OS-56A/UPM-70 Oscilloscope and SM-85/UPM-70 or SM-85A/UPM-70 Coder Simulator, each housed in an electrical equipment case. (Author)
PB-175 661 HC$3.00 MF$0.65

WEIGHING HEAVY LOADS TO AN ACCURACY OF 0.001 PERCENT,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
For primary bibliographic entry see Field 14B.
For abstract, see NSA 21 15.
RFP-839 HC$3.00 MF$0.65

9D. Information Theory

OPTIMUM QUANTIZATION OF RANDOM SEQUENCES.
Technical rept.,
Harvard Univ Cambridge Mass Div of Engineering and Applied Physics
Herbert Gish. May 67, 151p Rept no. TR-529
Contract Nonr-1866 (16)

Descriptors: (*Decoding, Optimization), (*Information theory, Sequences), (*Coding, Optimization), Digital systems, Algorithms, Iterative methods, Design, Simulation.

Whenever information is to undergo digital processing it must be given a quantized representation. The quantizers investigated are those which are optimum with respect to a mean square error criterion for stationary input sequences. They are permitted to have memory and it is shown that they belong to the class of quantized feedback systems which includes delta-modulators and predictive quantization systems (differential pulse-code modulation). Emphasized are the application of quantization to digital communication and considered are the analog to digital and digital to analog operations of the quantizer to be performed respectively by a transmitter and receiver. The analysis of the quantization system with a linear receiver is considered in depth. The results for random sequences are made applicable to the transmission of time continuous information by considering the random sequence to have been obtained by sampling a time continuous process, and by using an interpolator to reconstruct the continuous process from the quantized samples. Several examples are presented for the transmission of a Gauss-Markov process. The effect of bandlimiting the continuous process before sampling is also investigated. Comparisons are made with PCM and the rate distortion function.
AD-656 042 HC$3.00 MF$0.65

INFORMATION THEORY, LEARNING SYSTEMS, AND SELF-ORGANIZING CONTROL SYSTEMS.
Final rept., 1 Apr 64-31 Mar 67,
Scope Inc Falls Church Va
Malcolm Rucj Uffelman. 31 Mar 67, 51p
Contract Nonr-4467 (00)

Descriptors: (*Information theory, *Learning), (*Control systems, Diagrams), Errors, Pattern recognition, Training, Algorithms, Performance (Human), Reaction (Psychology), Measure theory, Probability.

Learning systems are defined on three levels of complexity, the trained system, the adaptive system, and the self-organizing system. The functional purpose of each is discussed in terms of the removal of noise and a theorem stating a necessary condition for adaption is stated and proven. The theorem is then applied to a simple form of adaptive system, and it is shown that for a linear threshold device employed within its 'natural capacity', two bits per weight are necessary. The information theoretic model of the self-organizing system is translated into a goal directed control system model. This self-organizing control system model is analyzed and shown to have a simple performance surface that can be searched by relaxation methods. Experiments are discussed. (Author)
AD-656 082 HC$3.00 MF$0.65

AN IMAGE RESTORATION EXPERIMENT ON TURBULENCE-DEGRADED IMAGES,
Scripps Institution of Oceanography San Diego Calif Visibility Lab
For primary bibliographic entry see Field 14E.
AD-656 124 HC$3.00 MF$0.65

SOME ADDITIONAL QUASI-PERFECT CODES.
Texas Univ Austin Dept of Electrical Engineering
Terry J. Wagner. 27 Sep 66, 4p
AFOSR-67-1759
Grants AF-AFOSR-766-67, NSF-GP-3012
Availability: Published in Information and Control v10 n3 p334 Mar 1967.

Descriptors: (*Coding, Errors), Corrections, Information theory.
Identifiers: Error-correcting codes, Quasi-perfect codes.

By using the search technique described in Wagner (1966), some additional new double error-correcting quasi-perfect codes have been found. (Author)
AD-656 130 Not available from CFSTI.

A SIMPLE RULE FOR CHECKING THE VALIDITY OF CERTAIN DETECTION FORMULAS.
Revised ed.,
Stanford Univ Calif Dept of Electrical Engineering
Thomas Kailath. 18 May 66, 4p
AFOSR-67-1700
Contract AF 49 (638)-1517
Revision of manuscript received 28 Mar 66.
Availability: Published in IEEE Transactions on Information Theory v1T-13 N1 p1966-7 Jan 1967.

Descriptors: (*Information theory, Mathematical analysis), (*Signals, Detection), Hilbert space, Signal-to-noise ratio, Correlation techniques, Integral equations, Statistical analysis.
Identifiers: Gaussian noise.

It is shown how reproducing kernel Hilbert space theory provides a simple test for checking the validity of proposed ideal receiver formulas for the detection of known signals in Gaussian noise. Two examples are worked out. (Author)
AD-656 221 Not available from CFSTI.

STATISTICAL COMMUNICATION THEORY.
Final rept. 1 Dec 63-31 Mar 67.
Northeastern Univ Boston Mass Communication Theory Group
Apr 67, 92p Rept no. 8
AFCRL-67-0272
Contract AF 19 (628)-3312, Grant NGR-22-011-013

Descriptors: (*Coding, Mathematical analysis), Adaptive systems, Digital systems, Random variables, Optimization, Errors, Sampling, Information theory, Theorems, Signals.
Identifiers: Autocorrelation function, Maximum likelihood, Error-correcting codes.

The report describes four current research efforts: arithmetic codes, non-binary orthogonal codes, error-correcting schemes, and filtering of PAM signals for a randomly selected channel. Seven Scientific Reports are summarized. The subject matter of these reports includes the following topics: linear product codes, detection of digital data, optimum interpolation of sampled functions, adaptive bandwidth compression, and the design and shaping of analog signals. (Author)
AD-656 348 HC$3.00 MF$0.65

STUDY AND ANALYSIS OF SPEECH PARAMETERS AND BANDWIDTH COMPRESSION TECHNIQUES.
Final rept. 31 May 66-30 Jun 67,
Georgia Inst of Tech Atlanta Engineering Experiment Station
Berry O. Pyron, and Fr: R. Williamson, Jr. 30 Jun 67, 113p

Contract DA-49-092-ARO-156
See also AD-635 944.

Descriptors: (*Speech recognition, Bandwidth), (*Speech, Analysis), Display systems, Gates (Circuits), Phonetics, Response, Multiplex, Tables, Sampling, Linguistics, Perception, Speech transmission, Linguistics, Sound pitch, Voice communication systems, English language.

Properties of the six stop consonants of English speech were studied with the aid of electronic gating circuitry. The apparatus made possible transient-free blanking of an adjustable-duration section at adjustable location in an input test utterance recorded on a tape loop. If desired, an excised section could be replaced with bandlimited white noise or other artificial signals. Altered and unaltered specimens were presented in random order to a listener team and responses evaluated. Results provide information on the distribution in time of recognition clues to perception of the stop consonants, and on the nature of such clues. Analog parameters representing running-average zero-crossing rate and amplitude envelope of the speech signal were extracted for 22 words spoken 10 times each by 8 speakers. These were converted to digital form and used to generate composite 20-by-20 matrices representing average plots of the one parameter vs. the other for all 80 repetitions of each word, as well as single-speaker word averages. The results bear on questions of automatic speech recognition. Bandwidth-compression experiments were also conducted, using electronic circuitry to reconstruct speech from narrowband transmitted analogs of the same two parameters. A multiplexer circuit was developed capable of switching sampling rates automatically at a desired amplitude level. (Author)
AD-656 478 HC$3.00 MF$0.65

TIME DOMAIN ANALYSIS OF IMPULSE RESPONSE TRAINS.
Technical rept.,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Thomas G. Kincaid. 31 May 67, 73p Rept no. TR-445
Contract DA-36-039-AMC-03200 (E), Grant NSF-GP-2495
Doctoral thesis.

Descriptors: (*Linear systems, Response), (*Signals, Analysis), Periodic variations, Mathematical analysis, Pulse systems, Matrix algebra, Theorems, Electrical networks, Tables, Theses.
Identifiers: Impulse response trains.

An impulse response train is a signal that can be described as the response of a linear time-invariant system to a sequence of equally spaced impulses of varying areas. The impulse response associated with such a signal is called the kernel of the impulse response train. A variety of physical systems generate signals in a manner indicating that the signals can be modeled by impulse response trains. Examples of such signals are the voiced sounds of speech, and the individual tones of wind instruments. Knowledge of the kernel of such physically generated signals would be useful for two reasons. First, the physical generating system can be simulated by a linear time-invariant system with the kernel as impulse response. Second, the class of signals generated by the system can be characterized by the kernel. This report shows how to find the kernel of an impulse response train directly from the signal itself. The method used to find the kernel involves only matrix multiplication and the solving of simultaneous linear equations. Once the kernel is found, the impulse areas can be determined, again, by the solution of simultaneous linear equations. All of these operations can be routinely carried out by an electronic digital computer.
AD-656 611 HC$3.00 MF$0.65

ON ADAPTIVE NETS.
Bell Aerosystems Co Buffalo N Y
For primary bibliographic entry see Field 12B.
AD-656 764 HC$3.00 MF$0.65

RESEARCH TO DEVELOP THE ALGEBRAIC THEORY OF CODES,
Sylvania Electronic Systems-East Waltham Mass Applied Research Lab
E. F. Assmus, Jr., H. F. Mattson, Jr., and R. J. Turyn. Jun 67, 80p Rept no. Scientific-1, S-7167-1 AFCRL-67-0365
Contract AF 19 (628)-5998

Descriptors: (*Coding, Mathematical analysis), Theorems, Groups (Mathematics), Invariance, Optimization, Information theory, Mapping (Transformations), Polynomials, Errors.
Identifiers: Error-correcting codes.

A number of new combinatorial designs are found as direct applications of the theory of error-correcting codes. Results on the automorphism groups of Hadamard matrices are presented. A simple proof of the well-known MacWilliams relations, together with a generalization, is given. We have constructed the (24, 12) extended code of Golay over GF (2) in a particularly simple way. We prove that teach of the seven 6; 2-15-36 designs ((v,k,lambda) designs) arising from the difference sets of size 15 in the Abelian groups of order 36 has only the obvious group as automorphism group. Each of these designs gives a Hadamard matrix of order 36. We determine the covering radius for BCH codes of design distance 2 over GF (q) for all odd prime powers q. We give two extensions of the Peterson-Kasami-Lin result on necessary and sufficient conditions for an extension of a cyclic code to be invariant under the affine group. Explicit factorizations of (x (to the lth power)-1) over the appropriate quadratic-number field for l=7, 11, 13, and 23 are given. (Author)
AD-656 783 HC$3.00 MF$0.65

COGNITIVE INFORMATION PROCESSING. XIII. VARIABLE-VELOCITY DELTA MODULATION,
Massachusetts Inst. of Tech., Cambridge.
S. D. Shoap. 1966, 11p

Descriptors: (*Coding, Digital systems), (*Delta modulation, Information theory), Pictures, Decoding, Brightness.
Identifiers: Variable-Velocity Delta Modulation.

A new digital picture coding scheme has been invented which in some respects is similar to variable-velocity scanning in analog T. V. systems. It has been named variable-velocity delta modulation because the scan rate in the system is not constant. This report describes the scheme and notes its advantages.
PB-175 676 HC$3.00 MF$0.65

INTRODUCTION TO THE THEORY OF SIGNAL-TO-NOISE ENHANCEMENT,
California Univ., Livermore. Lawrence Radiation Lab.
Thomas A. Brubaker. 5 Jan 67, 28p
Contract W-7405-eng-48

Descriptors: (*Signal-to-noise ratio, Theory), Statistical functions, Theorems, Measure theory.

For abstract, see NSA 21 15.
UCRL-50171 HC$3.00 MF$0.65

9E. Subsystems

THE THEORY AND PHYSICAL CONSTRAINTS OF AN ELECTRO-OPTICAL SIGNAL PROCESSOR FOR PHASED ARRAY ANTENNAS,
Columbia Univ., New York. Electronics Research Labs.
L. Lambert, and M. Arm. 1 Oct 63, 51p TR-T-1-199, CU-29-63
Contract AF 49 (638)-1113, ARPA Order-279

Descriptors: (*Antennas, Phased arrays), (*Phased arrays, Data processing systems), (*Data processing systems, Radar signals), Theory, Integral transforms, Modulation, Light, Light transmission, Piezoelectric transducers, Spectrum analyzers, Ultrasonic radiation, Multiplex, Resolution, Radar targets, Optical equipment.

Techniques are described for processing the signals obtained from the elements of a phased array antenna by means of electro-optical devices. These techniques employ one electro-optical device which simultaneously forms, as a continuum, all the beam patterns that a receiving planar array antenna is capable of forming. An analysis of an electro-optical processor for phased arrays is presented which shows that: (1) The target location angles are obtained unambiguously for each and every target that can be resolved, (2) Target angle resolution is identical to the resolution inherent in the antenna array, (3) Multiple targets produce multiple outputs with all angles properly associated, (4) The progressive envelope delay that is introduced at the antenna array does not result in an aperture-bandwidth constraint. Physical constraints on system bandwidth and the number of array elements that can be processed are considered. Typically, it should be possible to process electro-optically 10,000 array elements with a system bandwidth of 10 Mcs.
AD-446 299 HC$3.00

ORDNANCE ENGINEERING DESIGN HANDBOOK: SERVOMECHANISMS. SECTION 1: THEORY, CONSISTING OF CHAPTERS 1-10.
Office of the Chief of Ordnance Washington D C
For primary bibliographic entry see Field 19D.
AD-655 861 HC$3.00 MF$0.65

ORDNANCE ENGINEERING DESIGN HANDBOOK: SERVOMECHANISMS. SECTION 2: MEASUREMENT AND SIGNAL CONVERTERS, CONSISTING OF CHAPTERS 11-12.
Office of the Chief of Ordnance Washington D C
For primary bibliographic entry see Field 19D.
AD-655 862 HC$3.00 MF$0.65

ORDNANCE ENGINEERING DESIGN HANDBOOK: SERVOMECHANISMS. SECTION 3: AMPLIFICATION, CONSISTING OF CHAPTER 13.
Office of the Chief of Ordnance Washington D C
For primary bibliographic entry see Field 19D.
AD-655 863 HC$3.00 MF$0.65

DEVELOPMENT OF THIN FILM ELECTROLUMINESCENT DISPLAY TECHNIQUES.
Final rept. 15 Mar-15 Sep 66,
Sigmatron Inc Goleta Calif
E. J. Soxman. Apr 67, 38p
AMRL-TR-67-1
Contract AF 33 (615)-3644

Descriptors: (*Display systems, Electroluminescence), (*Films, Display systems), Phosphorescent materials, Zinc sulfides, Viewing screens, Brightness, Life expectancy, Substrates, Glass, Doping, Manganese.

An electroluminescent display panel of the cross-grid-matrix-type was fabricated on a 10-3/4 x 10-3/4-inch glass substrate using improved vacuum deposition procedures and a high brightness manganese-doped ZnS phosphor. This panel contained 256 x 256 active elements within an area of approximately 7 x 7 inches. Linear resolution was

36 elements per inch with a cross-conductor width of 0.020 inch and a separation of 0.007 inch. The display panel was successfully used as a viewing screen for rear-projected images. The brightness-voltage relationship of the thin film phosphor was such that a cross-suppression ratio in excess of 10,000 to 1 was achieved with an excited element brightness of 100 ft-L. Performance measurements indicated that the optimum drive frequency was about 15 kHz. For pulsed operation, a burst frequency of 37.5 Hz, a carrier frequency of 15 kHz, and a duty cycle of 0.25 percent gave an average brightness of a few foot-Lamberts. Useful operating lifetime of several hundred hours under the above conditions was indicated by preliminary data. The variation in brightness uniformity over a group of cells near the center of the panel was less than 7 percent at an average brightness level of 16 ft-L. A brightness reduction of about 12 percent was observed at a single cell when the contacting configuration was varied on the stannic oxide electrode. (Author)
AD-655 903 HC$3.00 MF$0.65

ANTENNA BREAKDOWN IN HIGH-TEMPERATURE AIR,
Aerospace Corp El Segundo Calif Labs Div
Glenn C. Light, and Edward C. Taylor. Jun 67, 31p Rept no. TR-1001 (2220-10)-3
SSD-TR-67-118
Contract AF 04 (695)-1001

Descriptors: (*Reentry vehicles, *Antennas), (*High-temperature research, *Reentry vehicles), Shock tubes, Ionization, Space environmental conditions, Electron density, Antenna apertures, Interferometers, High frequency, Measurement, Thermal stability, Tables, Electric fields, Equilibrium.

Investigations of antenna breakdown in high-temperature air are reviewed to show significant discrepancies between theoretical results and observations. It is argued on theoretical grounds that the discrepancies are due to the temperature-dependence of the electron-molecule energy transfer rate and that the conventional theory can be modified to take account of this effect. Experimental measurements obtained in shock-heated air are presented to confirm and quantify these conclusions. The relevance of these results to antenna breakdown on reentry vehicles is discussed. (Author)
AD-656 336 HC$3.00 MF$0.65

RESPONSE OF SEISMIC ARRAYS TO WIDE-BAND SIGNALS.
Technical note,
Massachusetts Inst of Tech Lexington Lincoln Lab
Edward J. Kelly. 29 Jun 67, 51p Rept no. TN-1967-30
ESD-TR-67-320
Contract AF 19 (628)-5167, ARPA Order-512

Descriptors: (*Antenna arrays, *Seismic waves), Broadband, Epicenter, Signals, Response, Attenuation, Statistical processes, Antenna radiation patterns, Seismometers.
Identifiers: LASA.

Response patterns are computed for the LASA and other arrays and for a class of wide-band signals. Results are displayed as contour plots in wavenumber space and in real space, with and without P-wave attenuation. (Author)
AD-656 344 HC$3.00 MF$0.65

RADIATION CHARACTERISTICS OF LOOP ANTENNAS EXCITED BY TRANSIENTS.
Technical rept.,
Massachusetts Inst of Tech Lexington Lincoln Lab
A. R. Dion. 14 Apr 67, 20p Rept no. TR-433
ESD-TR-67-238
Contract AF 19 (628)-5167

Descriptors: (*Loop antennas, *Electromagnetic waves), Transients, Excitation, Resolution, Dielectric properties, Voltage, Antenna radiation patterns, Electric fields, Fourier analysis.

The radiation characteristics of a rectangular loop loaded at its mid-point with a resistance equal to the radiation resistance, and fed by DC pulses, are derived and compared with measurements. In particular, the time variation of the electromagnetic pulse radiated by this antenna, and also of the voltage pulse induced at the terminals of a similar receiving antenna, is derived. The relationships between the characteristics of these pulses and the loop parameters are stressed. (Author)
AD-656 345 HC$3.00 MF$0.65

RADIATION EFFICIENCY OF VARIABLE-WAVE VELOCITY HORIZONTAL ANTENNA NEAR THE EARTH,
Naval Weapons Center Corona Labs Calif
Robert D. Smith, and Elwin W. Seeley. 1 Aug 67, 25p Rept no. NOLC-730

Descriptors: (*Antennas, Electromagnetic waves), Very low frequency, Efficiency, Velocity, Conductivity, Dipole antennas, Measurement, Tables.

Measurements were made on a horizontal conductor near the earth with periodic series capacitance inserted to control the wave velocity along the antenna. Increases in radiation efficiency as great as 15-fold were observed. The correlation between theoretical and experimental antenna efficiency was fair. (Author)
AD-656 397 HC$3.00 MF$0.65

APPLICATION OF NET-1 NETWORK ANALYSIS COMPUTER PROGRAM TO THE DC AND TRANSIENT ANALYSIS OF SWITCHING CIRCUITS.
Technical rept.,
Army Electronics Command Fort Monmouth N J
William V. Bell, and L. W. Leyking. May 67, 62p Rept no. ECOM-2834

Descriptors: (*Programming (Computers), Circuits), (*Switching circuits, Analysis), Logic circuits, Electrical networks, Gates (Circuits), Resistance (Electrical), Models (Simulations), Integrated circuits, Transistors.
Identifiers: NET-1 computer program.

The use of the NET-1 Circuit Analysis Program is described, and a comparison is made of the results obtained using a circuit modeled within the computer program and a similar breadboard circuit model. (Author)
AD-656 458 HC$3.00 MF$0.65

RESEARCH ON COMPACT AND EFFICIENT ANTENNAS.
Rept. no. 2, 1 Apr 66-31 Mar 67 (Final),
Airborne Instruments Lab Deer Park N Y
J. F. Ramsay, B. V. Popovich, and J. F. Gobler. Jul 67, 166p Rept no. AIL-1748-1
ECOM-02111-F
Contract DA-28-043-AMC-02111 (E)

Descriptors: (*Antennas, *Airborne), High frequency, Ultrahigh frequency, Dipole antennas, Attenuation, Conductivity, Reflection, Antenna configurations, Efficiency, Antenna radiation patterns, Elastomers, Communication systems, Measurement, Radio waves, Mathematical analysis, Dielectric properties.

To investigate the limitations of electrically small tactical HF communication antennas used over ground, measurements were made on scale model UHF antennas mounted on model UHF ground. The antennas used were dipoles or monopoles with groundplanes. The model ground consisted of a carbon-loaded polyurethane elastomer, designed to simulate HF ground at UHF. Measurements on the model antennas over the model ground resulted in agreement with theory where theory existed, and allowed comparison and evaluation of arbitrary antenna configurations and ground systems. The ground modeling technique proved especially valuable in determining the groundwave attenuation rate at relatively short ranges, and in investigating a figure of merit, rather than an efficiency, for an antenna intended for groundwave communications. It was found that a relatively small ground sample could provide data useful in determining the antenna performance. Theoretical studies were carried out to determine the magnitude of the power lost in the local region of an antenna of arbitrary configuration, and to predict the field at, or near, the antenna region and at long ranges for both dipole and groundplane antennas. This report contains a recommendation that typical uniform grounds be given standardized ground constants. Tables and graphs of the reflection coefficients versus angle of incidence of representative grounds were prepared for frequencies in the HF and VHF bands. (Author)
AD-656 479 HC$3.00 MF$0.65

FREE OSCILLATIONS OF LINEAR SYSTEMS WITH VARIABLE PARAMETERS,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 1C.
AD-656 559 HC$3.00 MF$0.65

THE DETERMINATION OF PERIODIC MODES IN RELAY SYSTEMS USING THE STATE SPACE APPROACH,
New Brunswick Univ Fredericton Dept of Electrical Engineering
For primary bibliographic entry see Field 9A.
AD-656 677 Not available from CFSTI.

HIGH-EFFICIENCY TRANSISTOR CW RF POWER AMPLIFIER.
Technical rept.,
Army Electronics Command Fort Monmouth N J
Dieter R. Lohrmann. May 67, 50p Rept no. ECOM-2836

Descriptors: (*Power amplifiers, *Transistors), Efficiency, Broadband, Very high frequency, Design, Circuits, Transformers, Mechanical drawings, Diagrams.

Research work on VHF transistor power amplifiers of the switched type demonstrates semi broadband designs yielding collector efficiencies as high as 80% at 40W output in the frequency range from 30 to 76 MHz. A laboratory model of such an amplifier was built. It was designed to fit the AN/VRC-12. (Author)
AD-656 740 HC$3.00 MF$0.65

FROM RESEARCH TO APPLICATION: A FOLLOW-UP EFFECTIVENESS STUDY OF GRANT AF-AFOSR-177-63, COMPUTER ANALYSIS AND SYNTHESIS OF ELECTRICAL CIRCUITS,
Air Force Office of Scientific Research Arlington Va
John C. Frost. 1967, 18p Rept no. AFOSR-67-1819

Descriptors: (*Electrical networks, Computer programs), Algorithms, Design, Electric filters, Optimization, Air force research, Department of Defense, Effectiveness.

Scientific advances cannot be made or ordered, but government funding of phenomena-oriented research can lead to new technologies and concepts which fill the gaps in recognized problem

areas. While the stream from basic research to application can often be measured only on a long-term scale, the results of research can also produce immediate payoffs. The research done by Dr. D. A. Calahan under AFOSR Grant 177-63 and subsequent grants has led to almost immediate applications of value to the Department of Defense and defense-oriented industries. Dr. Calahan's research in circuit theory resulted in computer programs for Analysis, Realization, and Sensitivity. Through personal interviews, telephone calls, and written communication with people who requested these programs, communication patterns and several applications were found. Dr. Calahan's programs have been used for missle and satellite systems, aircraft systems, seismology, acoustics, telecommunication, education and nuclear instrumentation. The long-range results of Dr. Calahan's research are yet to be seen, but his research is paying off today in solutions to design and analysis problems faced by defense-oriented industries. (Author)
AD-656 768 HC$3.00 MF$0.65

SYNTHESIS OF FINITE PASSIVE N-PORTS WITH PRESCRIBED POSITIVE REAL MATRICES OF SEVERAL VARIABLES,
Polytechnic Inst of Brooklyn Farmingdale N Y Dept of Electrophysics
Tosiro Koga. Jul 67, 51p
RADC-TR-67-365
Contract AF 30 (602)-3951

Descriptors: (*Electrical networks, Theory), Design, Transmission lines, Circuits, Theorems, Mathematical analysis.

Positive real functions and matrices of several variables are introduced concerning the design problem of a passive network composed of lumped elements with variable parameters. The importance of these functions and matrices has recently received considerable attention for application to the problem of synthesizing passive networks composed of noncommensurable transmission lines and lumped elements. The problem of synthesizing positive real functions and matrice of several variables has been discussed by several authors. However, the problem has not been solved generally, except for the two-variable lossless case and the case where a two-variable positive real function is prescribed as a bilinear function with respect to one of the two variables. In this paper, a most general solution to the above-mentioned problem is presented. It is shown that an arbitrarily prescribed n x n positive real matrix, symmetric or nonsymmetric, of several variables is realizable as the impedance or admittance matrix of a finite passive n-port. It is further shown that, if the matrix is symmetric, then it is realizable as a bilateral passive n-port. Related problems and discussions are also given. (Author)
AD-656 772 HC$3.00 MF$0.65

ADVANCED CONTROL SIGNAL PROCESSOR MODULE DESIGN, FABRICATION, AND TEST, PHASE V FINAL REPORT.
Martin Co., Orlando, Fla.
W. B. Towles. Jun 67, 36p NASA-CR-85972, OR-8874
Contract NAS8-11684

Descriptors: *Coating, *Inverter, *Microelectronics, *Signal processing, *Thin film, Design, Encapsulation, Fabrication, Film, Material, Module, Processing, Signal, Testing, Thin, Vibration.

For abstract, see STAR 05 18.
N67-31822 HC$3.00 MF$0.65

HIGH FREQUENCY DC REGULATOR BY MEANS OF THE SEQUENTIAL TIMING PROCESS.
Hochfrequenter Gleichspannungsregler Mittels des Zeitstaffelungsverfahren
Eidgenossische Technische Hochschule, Zurich (Switzerland).
I. Horvat. 1966, 102p DISS-3847
in German

Descriptors: *Direct current (dc), *Sequential control, *Switching circuit, Circuit, Control, Current, Direct, Electronics, High frequency, Ignition, Impulse, Mode, Regulator, Semiconductor, Sequence, Silicon, Stabilizer, Switching, Thyratron, Timing.

For abstract, see STAR 05 18.
N67-32102 HC$3.00 MF$0.65

9F. Telemetry

A STUDY OF TELEMETRY SYSTEMS FOR GUN LAUNCHED UPPER ATMOSPHERE PROBES,
National Research Council of Canada Ottawa (Ontario) Div of Radio and Electrical Engineering
J. K. Pulfer. 5 Oct 66, 9p
NRC-9571
Availability: Published in Canadian Aeronautics and Space Journal b13 n5 p223-30 May 1967.

Descriptors: (*Telemeter systems, *Atmospheric sounding), Sounding rockets, Balloons, Upper atmosphere, Performance (Engineering), Sensors, Vibration, Telemetering transmitters, Microwave communication systems, Multiplex, Coding, Scientific research.

The Radio and Electrical Engineering Division of the National Research Council and Computing Devices of Canada Limited have jointly undertaken a study of telemetry systems suitable for use in gun launched upper atmosphere probes. This report describes some of the results of the study. The types of experiments currently being conducted in rockets and balloons are listed, and the problems encountered in performing them in a high-g environment considered. Some conclusions are reached concerning the type of telemetry system most suitable for gun launched probes, taking into account the state of the art in vehicle performance, components and sensors, and estimated telemetry requirements. (Author)
AD-655 874 Not available from CFSTI.

LARGE APERTURE SEISMIC TELEMETERING SYSTEM FOR CENTRAL ALASKA.
Alaska Univ College Geophysical Inst
For primary bibliographic entry see Field 8K.
AD-656 688 HC$3.00 MF$0.65

SOVIET AUTOMATIC HYDROMETEOROLOGICAL NETWORK.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 4B.
AD-656 702 HC$3.00 MF$0.65

EARTH CONVERAGE FROM A CIRCULARLY SYMMETRIC SHAPED-BEAM ANTENNA ON A SYNCHRONOUS SATELLITE.
Technical note.,
Massachusetts Inst of Tech Lexington Lincoln Lab
J. Bruce Rankin. 27 Jun 67, 46p Rept no. TN-1967-29
ESD-TR-67-321
Contract AF 19 (628)-5167

Descriptors: (*Satellite antennas, *Antenna radiation patterns), (*Synchronous satellites, Antenna radiation patterns), Telemetering antennas, Gain, Differential equations.
Identifiers: Shaped-beam antennas.

Calculations were made to show the earth illumination from circularly symmetric antennas on synchronous satellites. The antenna directive gain is calculated as a function of antenna size, beam shape, intended beam pointing direction, error in the pointing direction, and the fraction of the earth surface illuminated. (Author)
AD-656 707 HC$3.00 MF$0.65

INVESTIGATIONS IN SPACE COMMUNICATIONS THEORY, INCLUDING TOPICS RELATED TO RANDOM PROCESSES, FILTERING, TELEMETRY SEMIANNUAL STATUS REPORT, 1 OCT. 1966 - 31 MAR. 1967.
Michigan Univ., Ann Arbor. Office of Research Administration.
F. J. Beutler, L. L. Rauch, and W. L. Root. 14 Jul 67, 3p NASA-CR-87004, REPT.-02905-18-P
Grant NSG-2-59

Descriptors: *Mathematical model, *Random process, *Space communication, Channel, Communication, Filter, Frequency, Gaussian noise, Impulse, Mathematics, Model, Process, Random, Sampling, Space, Statistics, Telemetry, Theory.

For abstract, see STAR 05 18.
N67-32534 HC$3.00 MF$0.65

10. ENERGY CONVERSION (NON-PROPULSIVE)

10A. Conversion Techniques

ANALYSIS OF THE ADVANCED NIMBUS POWER SYSTEMS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
C. N. Bolton, and P. S. Nekrasov. Jul 67, 34p
NASA-TM-X-55852, X-716-67-350

Descriptors: *Nimbus satellite, *Pulse width modulation (pwm), *Spacecraft power supply, *Voltage regulator, Converter, Modulation, Point, Power, Pulse, Pwm, Regulator, Solar, Spacecraft, Supply, Tracking, Voltage, Width.

For abstract, see STAR 05 18.
N67-32093 HC$3.00 MF$0.65

REVIEW AND EVALUATION OF PAST SOLAR CELL DEVELOPMENT EFFORTS.
David Sarnoff Research Center, Princeton, N. J. Astro-electronics Applied Research Lab.
P. A. Crossley, G. T. Noel, and M. Wolf. Jun 67, 85p NASA-CR-86979
Contract NASW-1427

Descriptors: *Bibliography, *Photovoltaic effect, *Solar cell, Barrier, Cell, Circuit, Copper, Cuprous, Effect, Layer, Oxide, Photovoltaic, Selenium, Solar.

For abstract, see STAR 05 18.
N67-32180 HC$3.00 MF$0.65

GEOMETRIC EFFICIENCY OF AN ELECTROFORMED NICKEL SOLAR CONCENTRATOR.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
O. K. Houck, and C. M. Willis. Aug 67, 32p
NASA-TN-D-4072
Contract 120-33-06-08-23

Descriptors: *Concentrator, *Geometric factor, *Optical path, *Ray tracing, *Solar energy, Calculation, Data, Efficiency, Electroforming, Energy, Factor, Geometry, Nickel, Optical, Paraboloid, Path, Ray, Solar, Tracing.

For abstract, see STAR 05 18.
N67-32383 HC$3.00 MF$0.65

Group 10A—Conversion techniques

MANNED MISSION PHOTOVOLTAIC POWER SYSTEM STUDY. VOLUME I - PROGRAM SUMMARY FINAL ENGINEERING REPORT, APR. 20, 1966 - JAN. 20, 1967.
Radio Corp. of America, Princeton, N. J. Astro-electronics Div.
9 Jun 67, 121p NASA-CR-65656, AED-R-3155, VOL. I
Contract NAS9-5266

Descriptors: *Module, *Photovoltaic cell, *Power conversion, *Solar power source, Array, Cell, Concept, Conversion, Cost, Design, Development, Estimate, Integration, Manned, Mission, Photovoltaic, Plan, Power, Program, Solar, Source, Tradeoff.

For abstract, see STAR 05 18.
N67-32522 HC$3.00 MF$0.65

MULTIKILOWATT SOLAR ARRAYS.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
D. W. Ritchie, and J. D. Sandstrom. 15 Jul 67, 19p NASA-CR-87005, JPL-TR-32-1140
Contract NAS7-100

Descriptors: *Photovoltaic conversion, *Solar cell, Array, Cadmium, Cell, Conversion, Density, Development, Device, Feasibility, Film, Lightweight, Photovoltaic, Power, Silicon, Solar, Structural, Sulfide, Technology, Thin.

For abstract, see STAR 05 18.
N67-32529 HC$3.00 MF$0.65

10B. Power Sources

COMPUTER PROGRAMS FOR THE OPTIMIZATION OF INTEGRATED INDIRECT HYDROCARBON FUEL CELL SYSTEMS.
Special rept.,
Chevron Research Co., Richmond, Calif.
M. J. Schlatter, and E. Hirsch. 29 Oct 65, 104p SR-5
Contracts DA-49-186-AMC-149 (D), DA-49-186-ORD-929
Supplement to Rept. no. SR-2 dated 1 Feb 65, Part 1, AD-456 739 and Part 2, AD-456 740.

Descriptors: (*Fuel cells, *Computer programs), Design, Steam, Hydrocarbons, Chemical equilibrium, Chemical reactions, Mathematical analysis, Numerical methods and procedures, Carbon dioxide, Water, Temperature, Pressure, Iterative methods, Programming languages, Carbon compounds, Monoxides, Hydrogen, Polyatomic molecules, Methane, Optimization, Oxidation.

The report gives computer programs used for calculations in Special Report No. 2. These programs are in sufficient detail to permit their use with any computer which can accept FORTRAN-coded input. Listings of the FORTRAN programs, detailed descriptions of the calculations which can be performed, and information facilitate their use are given. (Author)
AD-475 881 HC$3.00 MF$0.65

INVESTIGATION OF LARGE AREA DENDRITIC WEB TYPE GERMANIUM PHOTOVOLTAIC CELLS.
Quarterly progress report no. 1, 15 Jul-15 Oct 66, Westinghouse Electric Corp Youngwood Pa Semiconductor Div
Y. Ichikawa, T. Merritts, and N. Ernick. Jun 67, 40p
ECOM-02350-1
Contract DA-28-043-AMC-02350 (E)

Descriptors: (*Energy conversion, *Thermionic converters), Germanium, Silicon carbides, Power supplies, Optimization, Diffusion, Crystal growth, Physical properties, Manufacturing methods.
Identifiers: Thermophotovoltaic converters, Web crystals, Semiconductor junctions.

The report reviews design considerations that should yield high performance large area thermophotovoltaic cells on germanium web dendrite material. Process techniques related to germanium web growth for TPV cells are described. Initial effort on junction formation by the alloying and diffusion processes is reported. (Author)
AD-655 912 HC$3.00 MF$0.65

EXPLORATORY DEVELOPMENT MODEL MINIATURE HYDROGEN GENERATOR.
Semi-annual rept. no. 1, 1 Nov 66-30 Apr 67,
Union Carbide Corp Parma Ohio Fuel Cell Dept
J. E. Rothfleisch. Jul 67, 60p
ECOM-0114-1
Contract DAAB07-67-C-0114

Descriptors: (*Gas generating systems, *Hydrogen), (*Fuel cells, Gas generating systems), Jet engine fuels, Pyrolysis, Containers, Nickel, Design, Construction, Performance (Engineering), Furnaces, Fuel tanks, Control systems.
Identifiers: Reactors (Chemical), JP-4 fuels.

The purpose of this contract is to design, fabricate, qualify, and deliver two Exploratory Development Models of a miniature hydrogen generator for use with hydrogen/air fuel cells in the power range of 10 to 200 watts. Hydrogen will be generated by thermally cracking JP-4. This report covers the work done during the period 1 November 1966 through 30 April 1967 on Contract No. DAAB07-67-C-0114. As a result of the experimental program conducted during this period, the design, fabrication, and testing of a disposable nickel reaction vessel meeting all of the performance requirements of the contract has been successfully completed. In addition, a conceptual design of the overall hydrogen generator system was developed and experimental qualification of the individual system components including the furnace, burner, fuel tank and controls initiated. Assembly of a breadboard model is in progress and extended testing of this unit will begin shortly. (Author)
AD-655 913 HC$3.00 MF$0.65

DEVELOPMENT AND ENGINEER DESIGN TEST OF THE 10-KW, 60-CYCLE MILITARY STANDARD ENGINE GENERATOR SET MODEL SF 10.0 MD, VOLUME IV,
Army Engineer Research and Development Labs Fort Belvoir Va
Richard N. Belt. May 66, 345p Rept no. AERDL-1857-App-C-Vol-4
See also AD-656 442, AD-656 444.

Descriptors: (*Gas generator engines, Design), Performance (Engineering), Electric power production, Alternating current, Military engineering, Voltage regulators, Efficiency, Tables, Vibration, Tests.

The report covers the development and engineering design testing of the 10-KW, 60 cycle military standard engine generator set developed by the U. S. Army Engineer Research and Development Laboratories, Fort Belvoir, Virginia.
AD-656 441 HC$3.00 MF$0.65

DEVELOPMENT AND ENGINEER DESIGN TEST OF THE 10-KW, 60-CYCLE MILITARY STANDARD ENGINE GENERATOR SET MODEL SF 10.0 MD,
Army Engineer Research and Development Labs Fort Belvoir Va
Richard N. Belt. May 66, 262p Rept no. AERDL-1857-App-C-Vol-2
See also AD-656 441, AD-656 444.

Descriptors: (*Gas generator engines, Design), Performance (Engineering), Electric power production, Military engineering, Velocity, Stability, Efficiency, Tables, Voltage, Tests.

The report covers the development and engineering design testing of the 10 KW, 60 cycle military standard engine generator set Model SF 10.0 SD, developed by the U. S. Army Engineer Research and Development Laboratories, Fort Belvoir, Virginia.
AD-656 442 HC$3.00 MF$0.65

DEVELOPMENT AND TEST OF THE 1.5-KW, 60-CYCLE, MILITARY-DESIGN, ENGINE-DRIVEN GENERATOR SET, MODEL SF-1.5-MD.
Final rept., Jun 57-Dec 64,
Army Engineer Research and Development Labs Fort Belvoir Va
Charles P. Okopinski. Jun 66, 40p Rept no. AERDL-1860
See also AD-656 441, AD-656 442.

Descriptors: (*Gas generator engines, Design), Performance (Engineering), Electric power production, Portable, Alternating current, Military engineering, Voltage regulators, Efficiency, Tables, Vibration, Tests.

The report covers the development and engineering design testing of the 1.5 KW, 60-Cycle, Gasoline-Engine-Driven Generator Set developed by the U. S. Army Engineer Research and Development Laboratories, Fort Belvoir, Virginia, as a member of the U. S. Army Standard family of engine generator sets for general use with the field Army. The report concludes that the generator set is suitable for field use by the Army, but further improved performance can be realized by redesigning the basic exciter-generator-voltage regulator. (Author)
AD-656 444 HC$3.00 MF$0.65

INVESTIGATION OF MECHANISMS FOR ELECTROCHEMICAL CATALYSIS.
Final rept. 1 May 66-30 Apr 67,
Pratt and Whitney Aircraft East Hartford Conn
J. R. Aylward, and S. W. Smith. Jul 67, 66p Rept no. PWA-3108
ECOM-02205-F
Contract DA-28-043-AMC-02205 (E)

Descriptors: (*Fuel cells, Catalysts), (*Catalysts, *Silicides), Electrochemistry, Fuels, Oxidation, Compatibility, Doping, Platinum, Gold, Electrolytes, Hydrogen, Methanols, Titanium compounds, Tungsten compounds, Molybdenum compounds, Vanadium compounds, Tantalum compounds, Crystal structure.
Identifiers: Molybdenum disilicide, Tantalum silicides, Titanium silicides, Tungsten silicides, Vanadium silicides.

A program was conducted to investigate the mechanisms of electrocatalysis with respect to the anodic oxidation of selected fuels by novel electrocatalysts in acid electrolyte at temperatures below 150C and at ambient pressure. A limited number of materials (Interstitial compounds) were screened for corrosion resistance and catalytic activity, but the major emphasis was given to the study of the electrochemical properties of select transition metal silicides, since previous work had indicated some catalytic activity with these materials for fuel oxidation. The effect of surface doping the silicides with trace amounts of platinum and gold was also studied, and in addition the effect of trace amounts of platinum on the catalytic activity of gold surfaces was investigated. The silicides by themselves were found to have only slight catalytic activity for the oxidation of hydrogen or methanol, but, when combined with trace amounts of platinum they showed considerable activity. Investigations on TiSi2, WSi2, MoSi2, VSi2 and TaSi2 showed that their electrochemical behavior was related to crystal structure. Experiments with platinum-doped TiSi2 electrodes indicate that rela-

tively large amounts of platinum are required to obtain a catalytic activity which approaches that of an equivalent platinum sheet and that the utilization of the platinum is low. The oxidation of hydrogen on both smooth gold and gold black gave a limiting current density which decreases at potentials above 250 mv.
AD-656 468 HC$3.00 MF$0.65

RESEARCH ON THE ELECTROCHEMICAL OXIDATION OF HEXANE AND ITS ISOMERS.
Semiannual interim rept. no. 3, 16 Nov 66-15 May 67,
Tyco Labs Inc Waltham Mass
S. B. Brummer, A. H. Taylor, and M. J. Turner.
May 67, 80p
Contract DA-44-009-AMC-1408 (T)
See also AD-656 496.

Descriptors: (*Alkanes, Oxidation), (*Fuel cells, Alkanes), Electrochemistry, Electrodes, Platinum, Methane, Propanes, Carbon dioxide, Reaction kinetics, Oxidation-reduction reactions.
Identifiers: Hexanes.

The electrochemical reactions of CH4, C3H8, n-C6H14, and CO2 on platinum electrodes in 80% H3PO4 at 130C were investigated. Experimental studies of steady state kinetics, steady state adsorbate coverage on smooth and platinized Pt, and the kinetics of oxidation of the adsorbed layers have been made. Steady state coverage with C3H8, n-C6H14, and reduced CO2 is lower on platinized Pt than it is on smooth Pt. C3H8 coverage is much more pressure sensitive on platinized Pt. When CH4 is adsorbed on smooth Pt, it appears to break down rapidly to form O-type. This indicates the high reactivity of C1 radicals compared with O-type. Little or no CH-alpha is formed. At low potentials (< or = 0.30 v vs. RHE) the rate of C3H8 oxidation decreases with increase in pressure. Studies of the reactions of the O-type adsorbate with C3H8 on platinized Pt allow the tentative assignment of 8-10 electrons for each 3 carbon atoms for the step O-type to CO2.
AD-656 472 HC$3.00 MF$0.65

RESEARCH ON THE ELECTROCHEMICAL OXIDATION OF HEXANE AND ITS ISOMERS.
Semiannual interim rept. no. 2, 16 May-15 Nov 66,
Tyco Labs Inc Waltham Mass
S. B. Brummer. 15 Nov 66, 47p
Contract DA-44-009-AMC-1408 (T)
See also AD-634 846.

Descriptors: (*Alkanes, Oxidation), (*Fuel cells, Alkanes), Electrochemistry, Electrodes, Platinum, Propanes, Adsorption, Pressure, Carbon dioxide, Oxidation-reduction reactions, Reaction kinetics.
Identifiers: Hexanes.

The mechanism of the adsorption and oxidation of C3H8 and n-C6H14 on smooth Pt electrodes from 12M H3PO4 at 130C was studied using potentiostatic step and galvanostatic pulse techniques. Initial adsorption of n-C6H14 occurs as virtually unchanged hydrocarbon at a diffusionally controlled rate. Subsequently, the adsorbed hydrocarbon reacts to form three types of adsorbed product - O-type, CH-alpha, and CH-beta. O-type n-C6H14 is similar to O-type C3H8 and to the product formed on Pt in the presence of CO2, 'reduced CO2.' CH-beta, which has a low oxidation state and releases upwards of 4 electrons per site on oxidation, is unreactive both towards oxidation and towards reduction. It is probably a carbonaceous polymer. CH-alpha, which also has a low oxidation state, is relatively unreactive towards oxidation but can be readily reduced. It is probably a mixture of partially dehydrogenated alkyl radicals. The relation of these adsorbed species to the over-all hydrocarbon-to-CO2 reaction is discussed.
AD-656 496 HC$3.00 MF$0.65

DEVELOPMENT AND ENGINEER DESIGN TEST OF THE 10-KW, 60-CYCLE MILITARY STANDARD ENGINE GENERATOR SET MODEL SF 10.0 MD.
Final rept. Oct 62-Nov 64,
Army Engineer Research and Development Labs Fort Belvoir Va
Richard N. Belt. May 66, 111p Rept no. AERDL-1857
See also AD-656 442.

Descriptors: (*Gas generator engines, Design), Performance (Engineering), Electric power production, Military engineering, Control systems, Vibration, Efficiency, Voltage regulators, Tables, Tests.

The report covers design and test of the 10-kw, 60-cycle, Military Standard, gasoline-engine-driven generator set as procured under contract DA-44-009AMC 8 (T). Environmental testing, trailer tests, and winterization system are covered in addition to normal engineering design tests. The report concludes that this equipment is suitable for use by the field Army. (Author)
AD-656 614 HC$3.00 MF$0.65

DEVELOPMENT AND ENGINEER DESIGN TEST OF THE 10-KW, 60-CYCLE MILITARY STANDARD ENGINE GENERATOR SET MODEL SF 10.0 MD, VOLUME I,
Army Engineer Research and Development Labs Fort Belvoir Va
Richard N. Belt. May 66, 365p Rept no. AERDL-1857-App-C-Vol-1
See also AD-656 614.

Descriptors: (*Gas generator engines, Design), Performance (Engineering), Electric power production, Military engineering, Control systems, Vibration, Efficiency, Voltage regulators, Tables, Tests.

The report covers the development and engineering design testing of the 10-KW, 60-cycle military standard engine generator set developed by the U.S. Army Engineer Research and Development Laboratories, Fort Belvoir, Virginia.
AD-656 615 HC$3.00 MF$0.65

DEVELOPMENT AND ENGINEER DESIGN TEST OF THE 10-KW, 60-CYCLE MILITARY STANDARD ENGINE GENERATOR SET MODEL SF 10.0 MD, VOLUME III,
Army Engineer Research and Development Labs Fort Belvoir Va
Richard N. Belt. May 66, 214p Rept no. AERDL-1857-App-C-Vol-3

Descriptors: (*Gas generator engines, Design), Performance (Engineering), Electric power production, Military engineering, Voltage regulators, Efficiency, Tables, Vibration, Tests.

The report covers the development and engineering design testing of the 10-KW, 60-cycle military standard engine generator set, Model SF 10.0 MD, developed by the U. S. Army Engineer Research and Development Laboratories, Fort Belvoir, Virginia.
AD-656 616 HC$3.00 MF$0.65

PROGRESS REPORT FOR SNAP GENERAL SUPPORTING TECHNOLOGY, NOVEMBER 1966-JANUARY 1967,
Atomics International, Canoga Park, Calif.
For primary bibliographic entry see Field 18F.
For abstract, see NSA 21 15.
NAA-SR-12316 HC$3.00 MF$0.65

NIMBUS- B SOLAR CONVERSION POWER SUPPLY SUBSYSTEM QUARTERLY TECHNICAL REPORT, DEC. 1966 - FEB. 1967.
Radio Corp. of America, Princeton, N. J. Astro-electronics Div.
14 Apr 67, 63p NASA-CR-86660, AED-R-3164
Contract NAS5-9668

Descriptors: *Nimbus satellite, *Power supply, *Solar converter, Circuit, Control, Converter, Equipment, Ground, Module, Performance, Platform, Power, Reliability, Solar, Storage, Supply, Telemetry.

For abstract, see STAR 05 18.
N67-31505 HC$3.00 MF$0.65

ELECTROCHEMICAL STUDIES OF PLATINUM SURFACE OXIDATION IN RELATION TO HYDROCARBON OXIDATION. PART IV - STUDIES WITH C14- LABELLED COMPOUNDS IN RELATION TO CO2 FORMATION AND SURFACE OXIDATION OF PT INTERIM REPORT, JUN. 1964 - OCT. 1966.
Canadian Commercial Corp., Ottawa (Ontario).
For primary bibliographic entry see Field 7D.
For abstract, see STAR 05 18.
N67-31980 HC$3.00 MF$0.65

CONCEPTUAL MECHANIZATION STUDIES FOR A HORIZON DEFINITION SPACECRAFT ELECTRICAL POWER SUBSYSTEM.
Gulton Industries, Inc., Metuchen, N. J. Honeywell, Inc., Minneapolis, Minn. Spectrolab, Inc., Sylmar, Calif. Systems and Research Div.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 18.
N67-32006 HC$3.00 MF$0.65

SOLAR POWER SYSTEMS FOR SATELLITES IN NEAR- EARTH ORBITS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
C. M. Mac Kenzie. Mar 67, 30p NASA-TM-X-55826, X-716-67-77
Presented At the Ieee 6th Photovoltaic Specialists Conf., Cocoa Beach, Fla., 28-30 Mar. 1967 Submitted for Publication

Descriptors: *Applications technology satellite (ats), *Energy storage, *Explorer xxxiii satellite, *Nimbus satellite, *Solar power system, Array, Battery, Bus, Conference, Control, Conversion, Energy, Imp, Mission, Parallel, Power, Relay, Satellite, Sensor, Solar, Storage, System, Voltage.

For abstract, see STAR 05 18.
N67-32037 HC$3.00 MF$0.65

10C. Energy Storage

INVESTIGATION OF A PIN-STRUCTURE GERMANIUM PHOTOVOLTAIC CELL.
Semi-annual rept. 15 Jul 66-1 Feb 67,
Massachusetts Inst of Tech Cambridge Center for Materials Science and Engineering
B. D. Wedlock, R. Siegel, C. R. Hewes, and D. L. Smythe. Jun 67, 95p
ECOM-01978-2
Contract DA-28-043-AMC-01978 (E)

Descriptors: (*Germanium, *Radioactive batteries), Diodes, Resistance (Electrical), Efficiency, Intensity, Temperature, Geometry, Theory, Conductivity, Electron density, Sources, Design, Emissivity, Blackbody radiation.

Several phenomena affecting the V-I characteristics of PIN thermophotovoltaic converter diodes are discussed, including diffused layer recombination, minority carrier injection, and non-planar effects. Analysis of the distributed resistance is developed to estimate the optimum converter dimensions. Experimental results on several diodes are presented, and their behavior explained in terms

of the distributed resistance and an assumed lifetime law. A study of the mobility in the high injection intrinsic region was made, and an empirical formula for the variation with injection level established. It is shown that this formula lies between two proposed theories for mobility variation. (Author)
AD-656 619 HC$3.00 MF$0.65

DESIGN OF STANDARD LINE OF VENTED SILVER-ZINC BATTERIES.
Quarterly rept. no. 1, 10 Jan-9 Apr 67,
Eagle-Picher Industries Inc Joplin Mo Couples Dept
B. R. Hawkins, and E. S. Carr. Jul 67, 21p
ECOM-0216-1
Contract DAAB07-67-C-0216

Descriptors: (*Batteries + components, Design), (*Alkaline cells, Tests), Silver, Zinc, Containers, Configuration, Battery separators, Electrodes, Electrolytes.
Identifiers: Silver-zinc cells.

The purpose of the contract is to design and qualify a standard line of BB-462 ( )/U, BB-463 ( )/U, BB-464 ( )/U and BB-465 ( )/U vented silver-zinc batteries. A cell test series was initiated, primarily to obtain additional cycle data during the time required for molded cell case and cover tooling. Several cell designs are being evaluated, primarily in the BB-465 ( )/U configuration. In addition to preliminary manual cycles, test cells underwent in excess of sixty automatic cycles, with no failures. Design variables include type of separation, method of wrap, plate fabrication and electrolyte concentration.
AD-656 623 HC$3.00 MF$0.65

11. MATERIALS

11A. Adhesives and Seals

STUDY OF MICROMECHANICAL PROPERTIES OF ADHESIVE BONDED JOINTS.
Bimonthly progress rept. no. 3, 1 May-30 Jun 67,
General Precision Inc Little Falls N J Aerospace Research Center
John L. Rutherford, and Edward J. Hughes. 15 Jul 67, 33p
PA-TR-3591
Contract DAAA21-67-C-0500

Descriptors: (*Bonded joints, Mechanical properties), (*Adhesives, Shear stresses), Epoxy plastics, Films, Tensile properties, Test equipment, Deformation, Elasticity, Fracture (Mechanics), Mechanical properties.

The objective of the program is to demonstrate the feasibility of using a microstrain technique for measuring the mechanical properties of epoxy adhesives in thin film joints in tension, compression and shear. The report includes a summary of the progress during the first four months of this contract. During the current report period, the principal effort was devoted to the shear tests; the following accomplishments were achieved: To account for friction losses in the loading chain sprockets, a new load cell had to be built and mounted next to the torsion sprocket; The correction factor accounting for deformation in the adherends was established; The shear modulus for the principal epoxy system was found to be 388,000 plus or minus 30,000 psi; The material deformed elastically, with no evidence of viscoelasticity prior to fracture; Fracture stresses varied from 5600 to 7180 psi; The fracture was principally adhesive and was characterized by cracks in the epoxy. The results obtained to date represent a significant advance in the techniques available for measuring deformation characteristics of adhesives in actual joints. Such results should be extremely useful for an understanding of the mechanical behavior of adhesives. (Author)
AD-655 850 HC$3.00 MF$0.65

ENVIRONMENTAL SEALING OF CONNECTORS ON MILITARY CABLES,
Sandia Corp Albuquerque N Mex
For primary bibliographic entry see Field 9A.
AD-656 097 HC$3.00 MF$0.65

ADHESIVE THERMOPLASTIC COPOLYMERS FOR THE WIRE AND CABLE INDUSTRY,
Dow Chemical Co Midland Mich
G. E. Clock, G. A. Klumb, and R. C. Mildner. 1963, 25p
Prepared for presentation at the annual Wire and Cable Symposium 12th Asbury Park, N. J., December 4, 5, 6 1963.

Descriptors: (*Thermoplastics, Adhesives), Electric cables, Bonding, Stability, Electrical properties, Corrosion resistance, Mechanical properties, Bonded joints.

The pertinent characteristics are given of one particular copolymer in a range of new resins which by reason of their unique adhesive properties seem likely to have a marked influence on design in the cable industry, as they have in other fields. It is indicated in general terms how the resins may be used to modify existing designs to improve their general operating characteristics. Further, it is believed that in many cases their use will lead to related economics in materials which will more than offset the cost of the coating material and any additional process that may be involved. It is not intended to suggest that their successful application can be made without careful experimental work because in certain cases the solution to the heat transfer problem may be quite critical. Furthermore, it seems that some experimental work may prove necessary before the most economical designs, made possible by the use of these materials, are evolved. (Author)
AD-656 104 HC$3.00 MF$0.65

THE SYSTEMATIC CONTROL OF RUBBER TO METAL ADHESION IN THE WIRE AND CABLE INDUSTRY,
Hughson Chemical Co Erie Pa
For primary bibliographic entry see Field 13H.
AD-656 239 HC$3.00 MF$0.65

A RESIN-SEALED APPROACH TO COMMUNICATIONS SPLICING,
Minnesota Mining and Mfg Co St Paul
For primary bibliographic entry see Field 9A.
AD-656 263 HC$3.00 MF$0.65

11B. Ceramics, Refractories, and Glasses

THE CONDUCTION BANDS IN 6H AND 15R SILICON CARBIDE. I. HALL EFFECT AND INFRARED FARADAY ROTATION MEASUREMENTS.
Royal Aircraft Establishment Farnborough (England)
For primary bibliographic entry see Field 20L.
AD-656 008 HC$3.00 MF$0.65

MEASUREMENTS AND SINGLE-VELOCITY CALCULATIONS OF DIFFERENTIAL ANGULAR THERMAL-NEUTRON ALBEDOS FOR CONCRETE,
Oak Ridge National Lab Tenn
R. E. Maerker, and F. J. Muckenthaler. Jul 67, 56p Rept no. ORNL-4090
Contract W-7405-eng-26

Descriptors: (*Reinforced concrete, Measurement), Monte Carlo method, Thermal properties, Neutrons, Albedo, Gamma rays, Anisotropy, Scattering, Tables, Statistical analysis.

Measurements and single-velocity Monte Carlo calculations have been performed to determine the differential angular thermal-neutron albedos for a reinforced concrete from monodirectional beams of incident thermal neutrons. Preliminary calculations using a statistical estimation technique indicate up to 50 scatterings should be followed for each neutron in order to produce good estimates of the differential albedos, and up to 100 scatterings to produce good estimates of the capture gamma-ray differential dose albedos. Deviation between experiment and calculation can be reduced to an average of 5.1% for 72 points of comparison if an anisotropic scattering law for water deduced from earlier Argonne National Laboratory measurements is assumed. (Author)
AD-656 085 HC$3.00 MF$0.65

ELECTRICAL PROPERTIES AND DEFECT STRUCTURE OF A (0.13 YO1.5 . 0.87 ThO2) ELECTROLYTE.
Revised ed.,
Aerospace Research Labs Wright-Patterson AFB Ohio
J. M. Wimmer, L. R. Bidwell, and N. M. Tallan. 20 Oct 66, 8p Rept no. ARL-67-0126
Revision of manuscript submitted 5 May 67. Prepared for presentation at the Annual Meeting of the American Ceramic Society (67th), Philadelphia, Pa., May 5, 1965.
Availability: Published in Journal of the American Ceramic Society v50 n4 p198-201 Apr 1967.

Descriptors: (*Ceramic materials, *Electrolytes), (*Yttrium compounds, Transport properties), (*Thorium compounds, Transport properties), Electrical properties, Crystal lattice defects, Solid solutions, Electrical conductance, Ionic current, Electrolytic cells.
Identifiers: Ceramic electrolytes, Thorium oxide, Yttrium oxide.

High-density sintered disks of the composition 0.13 YO1.05 . 0.87 ThO2) are shown to be mixed conductors at high oxygen pressures (10-6 atm) by electrical conductivity and electrochemical cell measurements. The ac and dc conductivity measurements were made between 900 and 1600C over a wide range of oxygen partial pressures. A blocking-electrode polarization technique for determining transference numbers was not applicable at high oxygen pressures but appeared to work at the lower pressures, indicating a transition to n-type behavior. The electrochemical cell measurements show essentially completely ionic behavior at low oxygen pressure but indicate at least 0.1% electronic contribution at 10 to the -13th power atm at 1000C. The lower oxygen pressure limit for completely ionic behavior has not been determined but extends below the equilibrium pressures of an Mn-MnO2, Cr-Cr2O3 electrochemical cell at 1000C. (Author)
AD-656 185 Not available from CFSTI.

MECHANICAL SPLICE CLOSURES FOR TELEPHONE CABLES,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 9A.
AD-656 258 HC$3.00 MF$0.65

THE STRUCTURE OF THE M'-PHASE OF YTaO4, A THIRD FERGUSONITE POLYMORPH,
Aerospace Corp El Segundo Calif Labs Div
For primary bibliographic entry see Field 20B.
AD-656 335 HC$3.00 MF$0.65

EVALUATION TESTS OF A LOW-SINTER-TEMPERATURE, CERAMIC METALIZING PROCESS.

Army Electronics Command Fort Monmouth N J
For primary bibliographic entry see Field 13H.
AD-656 460 HC$3.00 MF$0.65

INVESTIGATION OF ELECTRON BEAM PROCESSING OF ALUMINUM OXIDE AND RELATED MATERIALS.
Final rept. 15 Nov 65-15 Nov 66,
Materials Research Corp Orangeburg N Y
W. Class, H. R. Nesor, and G. T. Murray. 15 Dec 66, 110p
AFCRL-67-0273
Contract AF 19 (628)-4089

Descriptors: (*Lasers, Materials), (*Alumina, *Crystal growth), (*Ruby, Crystal growth), (*Sapphires, Crystal growth), (*Garnet, Crystal growth), Refractory materials, Electron beam melting, Gas discharges, Zone melting, Cathodes, Single crystals, Crystal lattice defects, Plasma medium, Doping.

The report is concerned with the application of float-zone crystal growth techniques to refractory non-metallic materials currently of interest to the laser technology. Electron beam and hollow cathode discharge techniques were used to produce the molten zones. The electron beam technique yielded sapphire crystals having diameters up to 5/16 in. Dislocation densities of 100/sq cm were observed. Ruby crystals having similar diameters were also grown, but reveal a pronounced chromium coring because of the large chromium losses which occur in the electron beam environment. The hollow cathode technique yielded sapphire, ruby and yttrium aluminum garnet crystals. Both pure and doped garnet crystals were grown. Multiply doped garnets containing erbium and holmium were produced which do not contain the flawed core exhibited by Czochralski pulled crystals. Only a limited amount of work was done related to ruby growth because of feed rod preparation problems. (Author)
AD-656 769 HC$3.00 MF$0.65

INVESTIGATION OF THE KINETICS OF CRYSTALLIZATION OF MOLTEN BINARY AND TERNARY OXIDE SYSTEMS QUARTERLY STATUS REPORT, 1 MAR. - 31 MAY 1967.
United Aircraft Corp., East Hartford, Conn. Research Labs.
J. F. Bacon. 30 Jun 67, 53p NASA-CR-86606, QSR-7
Contract NASW-1301

Descriptors: *Crystallization, *Glass, *Kinetics, *Oxide, Aluminate, Binary, Calcium, Composition, Cordierite, Earth, Rare, Sapphire, System, Ternary, Yttrium.

For abstract, see STAR 05 18.
N67-31992 HC$3.00 MF$0.65

CLAY, AGGREGATE, AND CONCRETE.
Final research rept.,
Texas Transportation Inst., College Station.
Eugene Buth, Don L. Ivey, and Teddy J. Hirsch. Mar 67, 34p RR-71-3
Prepared in cooperation with Texas Highway Dept., and Bureau of Public Roads, Washington, D. C. Rept. on Deleterious Materials in Concrete.

Descriptors: (*Concrete, Contamination), Sand, Clay, Roads, Structural properties, Liquids, Shrinkage, X-ray diffraction analysis, Tests.
Identifiers: Aggregates (Materials).

The paper reports on the effects of clay contaminants on strength, shrinkage, and durability of concrete. Sand equivalent and loss by decantation tests are also compared. (Author)
PB-175 633 HC$3.00 MF$0.65

EFFECTS OF CHEMICAL ADMIXTURES IN CONCRETE AND MORTAR.
Research rept.,
Texas Transportation Inst., College Station.
Don L. Ivey, and Teddy J. Hirsch. Mar 67, 30p RR-70-3
Prepared in cooperation with Texas Highway Dept. and Bureau of Public Roads, Washington, D. C. Rept. on chemical admixtures for concrete.

Descriptors: (*Concrete, *Mixtures), Chemicals, Physical properties, Quality control, Shrinkage, Compressive properties, Tests, Cracks, Bridges, Roads.
Identifiers: Aggregates (Materials).

The paper reports physical effects of chemical admixtures on concrete and cement mortars, compares the variability of mortar tests with the variations encountered in concrete tests, and shows the degree of correlation of these tests with tests on concrete. The data presented provide a basis for utilizing a standard mortar for quality control tests of chemical admixtures. Most of the work is concentrated on compressive strength, shrinkage, and time of set. Also included are the results of durability tests on admixture concrete and a section on the control of chemical admixture uniformity. A theoretical solution for restrained shrinkage crack spacing is developed and a comparison of this theory with limited test data is shown. (Author)
PB-175 634 HC$3.00 MF$0.65

EVALUATION OF THE GYRATORY COMPACTOR FOR USE IN DESIGNING ASPHALTIC CONCRETE MIXTURES.
Final research rept.,
Louisiana Dept. of Highways. Research and Development Section.
Philip J. Arena. Dec 66, 52p RR-26
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Concrete, *Pavements), Asphalt, Mixtures, Design, Compressive properties, Analysis, Plasticity, Traffic, Roads, Louisiana.

The primary objective of this study was to evaluate the gyratory kneading compactor and to investigate the possibilities and capabilities of this type of equipment in comparison with Marshall compactor. Curves were developed for six different asphaltic concrete mixes with varying compactive efforts and asphalt contents using both gyratory and Marshall procedures. These curves indicated that a wide range of compactive efforts can be applied by the gyratory compactor which would be a definite advantage over the presently used Marshall impact hammer. Results showed that the optimum asphalt content can be obtained by means of the gyrographs which indicate whether or not the asphalt content for a mix at a given compactive effort is excessive. Analysis of pavement cores taken after 6 months of service showed that the void contents had decreased below the 75-blow laboratory Marshall design, indicating the need for a higher compactive effort in the laboratory, which may be beneficial in extending the service life of pavements. (Author)
PB-175 635 HC$3.00 MF$0.65

CREEP RECOVERY AND CREEP OF PRESHRUNK CONCRETE,
Missouri Univ., Columbia. Dept. of Civil Engineering.
Donald R. Buettner, and Ronald L. Hollrah. 1967, 51p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Reinforced concrete, *Creep), Deformation, Creep strength, Shrinkage, Deflection, Bridges, Compressive properties, Humidity, Viscosity, Environmental tests, Elasticity, Stresses, Handling, Tables.

The report presents the analysis of a laboratory investigation of concrete specimens subjected to creep tests. It was a continuation study of a cooperative research program, 'Study of the Effect of Creep and Shrinkage on the Deflection of Reinforced Concrete Bridges.' Changes in creep, apparent strain, and modulus of elasticity were determined for prism specimens which had been under axial compressive loads for about three years and were then unloaded and reloaded. Prisms which had been drying for about three years, and were essentially 'preshrunk,' were creep tested. Also the effect of time, constituents, and environment on the elastic modulus and strength of concrete were studied. The creep recovery behavior for the specimens in this study was considerably different from that previously reported for specimens loaded for a shorter period of time. From this study it appears that the magnitude of creep recovery may be related to the length of time which the specimen has been under sustained load. Similarly it was found that the basic, or viscous, creep appears to be a function of the age at the time of loading. Finally it was found that for the size of specimen used, both the elastic modulus and the ultimate compressive strength of the concrete generally decreases with time from the values obtained at 28 days after casting. (Author)
PB-175 639 HC$3.00 MF$0.65

11C. Coating, Colorants, and Finishes

APPLICATION OF PVC WIRE INSULATION BY FLUIDIZED BED METHODS,
Diamond Alkali Co Painesville Ohio
For primary bibliographic entry see Field 13H.
AD-656 060 HC$3.00 MF$0.65

A NEW METHOD FOR THE EXTRUSION AND VULCANIZATION OF QUALITY CABLE SHEATHS,
Pacific Automation Products Inc Glendale Calif
For primary bibliographic entry see Field 9A.
AD-656 075 HC$3.00 MF$0.65

DIFFUSION OF GASES THROUGH POLYETHYLENE CABLE JACKETS,
Whitney Blake Co New Haven Conn
Christian A. Alm, and Robert C. Hillman. Nov 62, 13p
Prepared for presentation at the Annual Symposium on Technical Progress in Communication Wires and Cables (11th), at Asbury Park, N. J., 28-30 Nov 62.

Descriptors: (*Polyethylene plastics, Permeability), (*Plastic coatings, Polyethylene plastics), Diffusion, Gases, Pressure.

A demand for shipment of pressurized polyethylene jacketed cables is expected to continue and probably increase. Such pressurizing offers the customer insurance against jacket defects prior to installation assuming temperature/time conditions are such that a positive pressure can be measured at the destination. A method for estimating the rate of pressure drop in pressurized cables is presented in this paper. The method is verified by experimental measurements. Gas diffusion and temperature variations can result in complete loss of pressure in pressurized cable; and therefore even complete loss of pressure is not a positive indication of jacket defects. In such cases it may be necessary to re-pressurize and measure the rate of pressure drop to check for jacket defects. (Author)
AD-656 076 HC$3.00 MF$0.65

POLYPROPYLENE CABLE WRAPS,
Hercules Powder Co Wilmington Del
Robert L. Wibbens, and T. A. Coneys. Dec 63, 14p

Prepared for presentation at the Annual Wire and Cable Symposium (12th), Asbury Park, N. J. December 1963.

Descriptors: (*Polyethylene plastics, Films), (*Electric cables, *Plastic coatings), Barrier coatings, Laminated plastics, Polyester plastics, Tensile properties, Electrical properties, Mechanical properties.

From a standpoint of inherent properties, flexibility of formulation and fabrication, and extremely attractive economics, polypropylene film has rightfully become a significant factor in wire and cable wraps--with a future limited only by the ingenuity of the industry and producers of resins and films. It is believed that for every wrap requirement, whether the need be for a thermal, moisture or dielectric barrier, a form of polypropylene exists or can be developed through mutual cooperation, which will improve the product, and in most instances, pave the way to lower costs.
AD-656 105 HC$3.00 MF$0.65

INTERMEDIATE AND LOW DENSITY LOW-PRESSURE POLYETHYLENES: THEIR PROPERTIES AND APPLICATIONS IN THE WIRE AND CABLE INDUSTRY,
Du Pont of Canada Ltd Montreal (Quebec) Plastics Dept
For primary bibliographic entry see Field 11I.
AD-656 108 HC$3.00 MF$0.65

TOUGHER WIRE JACKETS OF NYLON,
Du Pont de Nemours (E I) and Co Wilmington Del Plastics Dept
For primary bibliographic entry see Field 9A.
AD-656 117 HC$3.00 MF$0.65

THE EFFECT OF DIE LAND LENGTH ON THE SURFACE APPEARANCE OF LOW MELT INDEX POLYTHENE EXTRUDATES,
Canadian Industries Ltd New Toronto (Ontario) Plastics Div
For primary bibliographic entry see Field 13H.
AD-656 118 HC$3.00 MF$0.65

CHEMICALLY CROSS-LINKED POLYETHYLENE. A GENERAL-PURPOSE COMPOUND,
Anaconda Wire and Cable Co Marion Ind
For primary bibliographic entry see Field 11I.
AD-656 163 HC$3.00 MF$0.65

A DUAL-INSULATED TERMINATING CABLE,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 17B.
AD-656 167 HC$3.00 MF$0.65

FACTORS INFLUENCING ACCELERATED OZONE TESTING AND WEATHERING OF CABLE COMPOSITIONS,
Battelle Memorial Inst Columbus Ohio
W. J. Yurgen, S. Palinchak, and P. B. Stickney. Nov 61, 27p
Prepared for presentation at the Annual Symposium on Technical Progress in Communication Wire and Cables (10th), 29 Nov-1 Dec 61, held at Asbury Park, N. J.

Descriptors: (*Rubber coatings, Electric cables), (*Synthetic rubber, Aging (Materials)), Waxes, Elastomers, Additives, Protective treatments, Cracks, Degradation, Ozone, Corrosion resistance, Data.

The ozone resistance of a number of SBR specimens containing different sunproofing waxes was studied under various conditions in the ozone chamber and in outdoor weathering. Information obtained from the study showed that: (1) In outdoor exposure, the temperature at the time of initial exposure has a decided effect on the rate of cracking of SBR compositions containing different waxes. (2) Specimens containing certain waxes that did not crack at the higher temperatures cracked quickly when exposed at low temperatures. (3) The geometry of the specimen and the manner of exposure appear to affect the rate of cracking. (4) The type of recipe employed has a definite influence on stability when exposed to weathering and ozone. On the basis of these results, satisfactory correlation with outdoor exposure may only be obtained by evaluating ozone test data at at least two temperatures, e.g., 40 and 100F.
AD-656 172 HC$3.00 MF$0.65

CORRUGATED METALLIC SHEATH FOR COMMUNICATION AND DATA TRANSMISSION CABLES,
Simplex Wire and Cable Co Cambridge Mass
For primary bibliographic entry see Field 9A.
AD-656 181 HC$3.00 MF$0.65

WIRE JACKETS OF NYLON R = K (PQ) + (EC) TO THE X POWER
Du Pont de Nemours (E I) and Co Wilmington Del Polychemicals Dept
E. C. McKannan, and R. E. Shaw. 1960, 8p
Annual Wire and Cable Symposium (9th) 1 Dec 1960.

Descriptors: (*Nylon, Plastic coatings), (*Electric wire, *Plastic coatings), Reliability, Performance (Engineering), Wear resistance, Life expectancy.

The equation suggested in the title is based more on experience than on rigorous mathematics. It is a short-hand expression which says that reliability is dependent on polymer quality of the wire coatings and, to an even greater extent, on the extrusion techniques used. The article presents the reasons for this statement. It also summarizes the engineering care which is required of material suppliers and wire coaters to provide reliable wires.
AD-656 203 HC$3.00 MF$0.65

SIMULTANEOUS EXTRUSION OF POLYETHYLENE AND POLYVINYL CHLORIDE COATINGS ON ELECTRICAL CONDUCTORS,
Western Electric Co Inc Baltimore Md
For primary bibliographic entry see Field 13H.
AD-656 205 HC$3.00 MF$0.65

NYLON 6 AS A WIRE JACKETING MATERIAL,
Spencer Chemical Co Henderson Ky Nylon Technical Dept
C. W. Taylor. 2 Dec 59, 12p
Annual Wire and Cable Symposium (8th), Asbury Park, N. J., 2 Dec 1959.

Descriptors: (*Nylon, Plastic coatings), (*Electric wire, Plastic coatings), Extrusion, Physical properties, Aging (Materials), Heat treatment, Wear resistance, Polymerization, Processing.

Nylon NX-121 has all the physical properties essential to withstand the most rigorous service conditions. The continuous polymerization process makes available resins with variable viscosities which can be adapted to each fabricator's particular requirements. Satisfactory heat aging results can be obtained with these materials, particularly if processed within recommended temperature ranges. The effects of water bath temperature and distance on heat aging properties were negligible, and abrasion resistance varied only slightly under different processing conditions. (Author)
AD-656 228 HC$3.00 MF$0.65

USE AND ABUSE OF PLASTIC INSULATION AND JACKETS,
Hydro-Electric Power Commission of Ontario (Canada)
For primary bibliographic entry see Field 9A.
AD-656 231 HC$3.00 MF$0.65

ETHYLENE COPOLYMERS FOR WIRE COATING,
Phillips Chemical Co Bartlesville Okla Plastics Sales Div
For primary bibliographic entry see Field 11I.
AD-656 235 HC$3.00 MF$0.65

THE DESIGN OF DIES FOR HIGH-SPEED WIRE COATING,
Tennessee Eastman Co Kingsport
For primary bibliographic entry see Field 13I.
AD-656 238 HC$3.00 MF$0.65

THE SYSTEMATIC CONTROL OF RUBBER TO METAL ADHESION IN THE WIRE AND CABLE INDUSTRY,
Hughson Chemical Co Erie Pa
For primary bibliographic entry see Field 13H.
AD-656 239 HC$3.00 MF$0.65

DESIGN AND APPLICATION OF MISSILE CABLES EMPLOYING LAYTEX INSULATION,
Kaiser Aluminum and Chemical Corp Bristol R I Bristol Works
For primary bibliographic entry see Field 9A.
AD-656 241 HC$3.00 MF$0.65

DITRIDECYL PHTHALATE (DTDP) IN HIGH TEMPERATURE VINYL INSULATION,
Enjay Labs Linden N J
For primary bibliographic entry see Field 7C.
AD-656 247 HC$3.00 MF$0.65

THE NATURAL AND ARTIFICIAL AGING OF WIRE JACKETS,
Battelle Memorial Inst Columbus Ohio
Charles W. Hamilton, Robert I. Leininger, and G. M. L. Sommerman. 1954, 28p
Contract DA-36-039-sc-15436
Prepared for presentation at Annual Symposium on Technical Progress Communication Wire and Cables, Asbury Park, N. J., December 7-9, 1954.

Descriptors: (*Plastic coatings, Aging (Materials)), (*Electric wire, Plastic coatings), Nylon, Degradation, Environmental tests, Electrical properties, Synthetic rubber, Vinyl plastics, Life expectancy, Tensile properties, Radiation damage, Ion bombardment.

The study shows that the principal factors affecting the degradation of nylon are ultraviolet light and heat. It has also been shown that natural outdoor aging leads to embrittlement and loss of tensile strength. The principal effect of exposure to ultraviolet light is that of cleavage of the molecule, while heat initially causes cross linking with subsequent cleavage. Moisture, while important in the instantaneous physical properties of nylon, plays no important role in the degradation of the molecule. The electrical tests on nylon sheets made under the conditions employed in this investigation are valuable in showing what happens in the nylon during exposure to various conditions of outdoor exposure and artificial aging. Information has been obtained on the leaching out of impurities under certain aging conditions and the production of ionizable reaction products under other aging conditions. The extreme avidity of the nylons for moisture has been emphasized by some of the observations made during the investigation. In the case of the other plastic samples, it is seen that these materials are very much more resistant to weathering than nylon, with the exception of the perbunan-vinyl compound. This material failed the mandrel-wrap test after 6 to 9 months' exposure.
AD-656 262 HC$3.00 MF$0.65

THE EFFECTS OF CONDUCTOR TEMPERATURE ON THE QUALITY OF EXTRUDED VINYL WIRE INSULATION,

Bakelite Co Bound Brook N J
For primary bibliographic entry see Field 13H.
AD-656 266 HC$3.00 MF$0.65

FLAME RETARDANT POLYETHYLENE FOR WIRE AND CABLE,
Rome Cable Corp N Y
For primary bibliographic entry see Field 11I.
AD-656 293 HC$3.00 MF$0.65

STATUS OF POLYMONOTRIFLUOROCHLOROETHYLENE INSULATED WIRE,
Brand-Rex Div Willimantic Conn
For primary bibliographic entry see Field 9A.
AD-656 319 HC$3.00 MF$0.65

THERMOPLASTIC INSULATED AND SHEATHED TELEPHONE CABLE FOR RURAL ELECTRIFICATION ADMINISTRATION TELEPHONE BORROWERS' SYSTEMS,
Rural Electrification Administration Washington D C
For primary bibliographic entry see Field 17B.
AD-656 320 HC$3.00 MF$0.65

NATURAL AGING OF NEOPRENE JACKETED TELEPHONE DROP WIRE,
Whitney Blake Co New Haven Conn
R. H. Dudley, and C. A. Larson. 1953, 4p
Prepared for presentation at Annual Symposium on Technical Progress in Communication Wires and Cables (2nd), Asbury Park, N. J., December 14, 1953.

Descriptors: (*Synthetic rubber, Aging (Materials)), (*Rubber coatings, Telephone lines), Acceptability.

Data is presented on documented samples submitted to natural outdoor aging for periods of seven to nine years. This time exceeds the average service life of weatherproofed drop wire. These data demonstrate that neoprene jacketed drop wire remains serviceable after this aging and indicate that it will remain serviceable for a considerably longer time. (Author)
AD-656 330 HC$3.00 MF$0.65

THICKNESS MEASUREMENT AND CONTROL IN THE MANUFACTURE OF POLYETHYLENE CABLE SHEATH,
Western Electric Co Inc Kearny N J
Walter T. Eppler. Dec 53, 28p
Prepared for presentation at the Signal Corps Engineering Labs. Symposium on Technical Progress in Communication Wires and Cable, Asbury Park, N. J., 14 Dec 53.

Descriptors: (*Polyethylene plastics, Plastic coatings), (*Electric cables, Plastic coatings), Thickness, Manufacturing methods, Extrusion, Quality control, Non-destructive testing.

Control of the concentricity and average thickness from the former method of end sampling resulted in eccentricity of the sheath in the order of 30 to 60%. At that time the safe practice was to make the average thickness greater than specified nominal in order to keep the thin side of eccentric sheath within the minimum spot limit. This excess amounted to approximately 10%. With the test set, concentricity within 10% is maintained under good operating practice and within 20% as a common condition. Average thickness can be controlled to within plus or minus .003 of an inch. This improvement in concentricity and thickness control permits operating at specified nominal thickness without varying below minimum limits and thereby eliminates the 10% excess usage of Polyethylene. In conclusion, this test equipment has proved to be practical means to the control of the concentricity and the average thickness of the Polyethylene sheath of Alpeth and Stalpeth cables. It measures the sheath wall thickness directly in thousandths of an inch both visually and as a recorded graph and does so non-destructively as the sheath is applied. It is accurate, reliable and of construction suitable for continuous shop use. The sheath is of consistently high dimensional quality not previously obtainable. Two major advantages have been gained. (1) Polyethylene is conserved and manufacturing cost reduced. Eleven percent thinner sheath wall thicknesses are practical with the improvement in concentricity. At capacity level, the polyethylene saving is 500,000 lbs. per year. (2) The quality of the sheath is improved through close dimensional control. (Author)
AD-656 332 HC$3.00 MF$0.65

A USER'S VIEW OF PLASTIC INSULATED CONDUCTORS IN OUTSIDE TELEPHONE PLANT,
Michigan Bell Telephone Co Detroit
For primary bibliographic entry see Field 17B.
AD-656 372 HC$3.00 MF$0.65

RECENT PROGRESS IN MAGNET WIRE ENAMELS,
Anaconda Wire and Cable Co Muskegon Mich Magnet Wire Research Lab
H. L. Saums, and W. W. Pendleton. 1955, 25p
Annual Wire and Cable Symposium (4th), Asbury, N. J., December 6-8, 1955.

Descriptors: (*Ceramic coatings, *Electric wire), (*Varnishes, Electric wire), Magnets, Silicones, Thermal stability, Plastic paints, Polyester plastics, Halocarbon plastics, Acrylic resins, Isocyanate plastics, Epoxy plastics, Phenolic plastics.

Beginning with organic based synthetic polymer substitutes for natural resins, wire enamels have been developed for added toughness, flexibility, heat stability, and resistance to a variety of environments including moisture, solvents, other resins, and contaminants. In the last three years, development has been concentrated on thermal stability improvement. Many new organic resin enameled magnet wires have emerged having long life expectancies at temperatures in excess of 105C, the hot-test spot temperature of Class A in the AIEE Standard No. 1 classification which currently is being revised to allow use of the materials discussed in this paper. Aside from organic enamels, a series of modified silicone enamels has been offered for magnet wire. This development has had limited success. The present materials need further improvement in mechanical properties. The writers have combined the properties of the modified silicones and polytetrafluoroethylene to produce a magnet wire capable of operation at 250C. with long expected life. The paper discusses this development in brief. The paper adds a note of caution in the trend to accept many new materials solely on the basis of thermal stability without a careful investigation of the mechanical, electrical and chemical properties and their relations to the thermal shock properties of the enamels as applied to magnet wire. An example is given of the possible difficulties which can be expected when a product showing excellent thermal stability, but certain other deficiencies, is used without caution. (Author)
AD-656 377 HC$3.00 MF$0.65

COMPOUND FOR HEAT RESISTANT INSULATIONS AND JACKETS,
Vanderbilt (R T) Co Inc East Norwalk Conn Rubber Div
For primary bibliographic entry see Field 11J.
AD-656 414 HC$3.00 MF$0.65

NEW DEVELOPMENTS IN HI-FAX COVERINGS FOR WIRE AND CABLE,
Hercules Powder Co Wilmington Del
W. P. Acton, and W. O. Bracken. Dec 57, 5p
Annual Wire and Cable Symposium (6th) on Technical Progress in Communication Wires and Cables, Asbury Park, N. J., 3-5 Dec 57.

Descriptors: (*Plastic coatings, *Polyethylene plastics), Electric wire, Electric cables, Shock resistance, Stresses, Fracture (Mechanics), Performance (Engineering).

The article discusses two types of Hi-fax to the wire and cable industry. The 1600 type is recommended for use in all applications not requiring the ultimate in stress-crack resistance. This type has moderate stress-crack resistance, somewhat better than the stress-crack resistance of 1-2 melt index low molecular weight polyethylene which has found wide acceptance in this market. The heat-shock resistance of 1600 Hi-fax at normal operating temperatures is at least comparable to the heat-shock resistance of 1-2 melt index low density polyethylene. Extended exposure to high temperatures is not recommended for either low density polyethylene or Hi-fax because of the susceptibility to oxidation. However, even at 90C., the heat-shock resistance of 1600 type Hi-fax is very good. Applications such as cable sheaths, where the ultimate in stress-crack resistance is required, require use of 1800 type Hi-fax. Although this is a higher molecular weight resin than the 1600 type, it has similar physical and electrical properties, but has a substantially higher level of stress-crack and heat-shock resistance. The higher molecular weight resin will withstand more than 1,000 hours' exposure without failure in the Bell Laboratories stress-cracking test. Therefore, in stress-crack resistance, it is equivalent to the low melt index, low density polyethylene now used for sheaths.
AD-656 416 HC$3.00 MF$0.65

THE EFFECT OF STOCK TEMPERATURE ON THE PHYSICAL PROPERTIES OF POLYTHENE COATINGS FOR WIRE,
Canadian Industries Ltd New Toronto (Ontario) Plastics Div
J. A. Durno. Dec 57, 8p
Annual Wire and Cable Symposium (6th) on Technical Progress in Wires and Cables Asbury Park, N. J., 3-5 Dec 57.

Descriptors: (*Electric wire, *Plastic coatings), (*Polyethylene plastics, Plastic coatings), Temperature, Physical properties, Extrusion, Tensile properties.

One of the many factors to be considered during the extrusion coating of wire, is the stock temperature of the extrudate at the point where it comes into contact with the conductor. The effect on the physical properties of the resulting conductor coating of a range of stock temperatures was determined for low density polythene. It is the purpose of this paper to present the findings obtained, with emphasis being placed on the ultimate tensile strength and elongation at break of the extruded coating. In this study, stock temperature was measured with a hand pyrometer, the needle of which was immersed in the melt about half an inch from the end of the cross-head insert. It has been found that the ultimate tensile strength and elongation at break of low density polythene coatings on wire are very dependent upon the stock temperature which the extrudate has attained by the time it has come into contact with the moving conductor. The general trend of improving tensile properties with increasing stock temperature has been observed for polythenes varying in melt index from about 0.4 to about 7.00, for aged and unaged samples and for several cross-head insert designs. (Author)
AD-656 417 HC$3.00 MF$0.65

RESISTANCE OF RUBBER COVERED CABLE, JACKET, AND INSULATION STOCKS TO WEATHER AND ARTIFICIAL AGING,

Army Engineer Research and Development Labs
Fort Belvoir Va
For primary bibliographic entry see Field 9A.
AD-656 516 HC$3.00 MF$0.65

ALUMINUM SHEATHING PRESS,
General Cable Corp New York
For primary bibliographic entry see Field 13I.
AD-656 519 HC$3.00 MF$0.65

NEW DEVELOPMENTS IN CABLE JACKETING COMPOUNDS,
Bakelite Co New York
For primary bibliographic entry see Field 11I.
AD-656 521 HC$3.00 MF$0.65

PROPERTIES OF HYPALON WIRE CONVERINGS,
Du Pont de Nemours (E I) and Co Wilmington Del Elastomers Div
For primary bibliographic entry see Field 11J.
AD-656 523 HC$3.00 MF$0.65

11D. Composite Materials

APPLICATION OF REACTION RATE ANALYSIS TO THE MECHANICAL PROPERTIES OF GLASS-REINFORCED PLASTICS.
Technical rept.,
Picatinny Arsenal Dover N J Feltman Research Labs
E. McAbee, and D. W. Levi. Aug 67, 29p
PA-TR-3556

Descriptors: (*Reinforced plastics, Mechanical properties), Polyester plastics, Epoxy plastics, Reinforcing materials, Glass textiles, Tensile properties, Statistical analysis, Equations.

Tensile strength data for 181 glass-cloth-reinforced polyester and epoxy were analyzed according to a modified rate equation. While these materials show somewhat more scatter than was encountered with the thermoplastic materials the agreement was such that a reasonable prediction of behavior could be made. (Author)
AD-655 857 HC$3.00 MF$0.65

CARBON FIBER REINFORCED PLASTICS - AN INITIAL EVALUATION.
Technical rept.,
Royal Aircraft Establishment Farnborough (England)
L. N. Phillips. Apr 67, 34p Rept no. RAE-TR-67088

Descriptors: (*Reinforced plastics, Acceptability), (*Reinforcing materials, Carbon fibers), (*Carbon fibers, Compatibility), Thermosetting plastics, Composite materials, Preparation, Physical properties, Mechanical properties, Phenolic plastics, Epoxy plastics, Great Britain.

The R.A.E. carbon fibre is shown to be compatible with a wide range of thermosetting polymers and techniques are described for incorporating useful volume fractions of fibre into resin-bonded composites. Several important mechanical and physical properties were measured; the good strength and very high specific stiffness predicted from the fibre properties were confirmed. A number of favourable potential applications for carbon-fibre plastics are discussed and an outline is given of the future programme of development. (Author)
AD-655 890 HC$3.00 MF$0.65

FIBER REINFORCED BORANE-BASED RESIN COMPOSITES. A NEW APPROACH TO OXIDATIVE THERMAL STABILITY.
Technical rept.,
Olin Mathieson Chemical Corp New Haven Conn Chemicals Group
H. A. Schroeder, and J. T. Trainor. Aug 67, 12p
Rept no. TR-38
Contract Nonr-3395 (00)
Prepared for presentation at the National SAMPE Symposium (12th).

Descriptors: (*Heat-resistant materials, Reinforced plastics), (*Reinforced plastics, *Boranes), Binders, Polymers, Organoboranes, Reinforcing materials, Asbestos, Thermal stability, Oxidation, Composite materials, Material forming.

A series of novel boron-based polymers was evaluated as binders in heat and oxidation resistant reinforced plastic structures. The preponderance of data concerns resin/asbestos composites which were found to exhibit a remarkable retention of their physical properties after heat-aging for 1000 hours in air. Despite current limitations such as resin insolubility, relatively severe processing conditions and hydrolytic instability of the fabricated parts, application of these systems can be foreseen for service as structural components when extended use in air between 700 and 900F is required. (Author)
AD-656 088 HC$3.00 MF$0.65

THE MODIFICATION OF BUTYL RUBBER WITH POLYETHYLENE FOR WIRE AND CABLE.
Polymer Corp Ltd Sarnia (Ontario)
For primary bibliographic entry see Field 11J.
AD-656 102 HC$3.00 MF$0.65

STRESS AND DEFLECTION ANALYSIS OF FIBROUS COMPOSITE MATERIALS UNDER EXTERNAL LOAD.
Summary technical rept. no. 1, 15 Oct 65-15 Mar 67,
Ohio State Univ Research Foundation Columbus
William E. Clausen, and Arthur W. Leissa. Jun 67, 78p
AFML-TR-67-151
Contract AF 33 (615)-3298

Descriptors: (*Composite materials, Loading (Mechanics)), Stresses, Deflection, Computer programs, Fibers, Differential equations, Shear stresses, Mathematical analysis.
Identifiers: Point matching.

The purpose of the work is to apply the point-matching technique to the stress and deflection analysis of fibrous composite materials; to develop a computer program, based on the method, to solve transverse normal loading problems involving fibers with cross-sections having two axes of symmetry in a staggered array; and to demonstrate the use of the computer program. The separate constituent materials are assumed to be linearly elastic, isotropic, and homogeneous. The bonding between the fiber and matrix materials is assumed to be perfect. The equations of plane strain theory are presented and the Michell solution in polar coordinates is used. The point-matching method is used to satisfy the boundary conditions in the least squares sense at a finite number of discrete points. (Author)
AD-656 431 HC$3.00 MF$0.65

STUDY OF A HEAT-RESISTANT PLASTIC LAMINATE FROM THE STANDPOINT OF A MECHANICAL-CHEMICAL EQUATION OF STATE,
Army Engineer Research and Development Labs
Fort Belvoir Va
S. Goldfein. Jun 67, 24p Rept no. AERDL-1901

Descriptors: (*Heat-resistant materials, Thermal stability), (*Laminated plastics, Degradation), Epoxy plastics, Glass textiles, Reinforced plastics, Pyrolysis, Equations of state, Rupture, Predictions, Mechanical properties, Tensile properties, Compressive properties.

The object of the study was to analyze the complex degradation history of a heat-resistant epoxy resin laminate using the mechanical-chemical equation of state. A further object was to determine if weight-loss measurements at elevated temperatures could be used to predict long-term rupture strength. Master rupture curves drawn using a second-order parametric form of the equation of state largely clarified the anomolous behavior of the laminate. It was not found possible to predict the long-term mechanical properties from weight-loss data. (Author)
AD-656 443 HC$3.00 MF$0.65

THERMOPHYSICAL PROPERTIES OF A LOW-DENSITY PHENOLIC-NYLON ABLATION MATERIAL.
Southern Research Inst., Birmingham, Ala.
W. T. Engelke, C. D. Pears, and C. M. Pyron, Jr..
Jul 67, 119p NASA-CR-809
Contract NAS1-2978

Descriptors: *Ablating material, *Nylon, *Phenol resin, *Thermophysical property, Ablation, Arc, Capacity, Composite, Conductivity, Cooling, Degradation, Heat, Low density, Material, Phenol, Property, Resin, Thermal, Thermophysical, Tunnel.

For abstract, see STAR 05 18.
N67-31536 HC$3.00 MF$0.65

COMPOSITE MATERIALS.
Materiaux Composites
Advisory Group for Aerospace Research and Development, Paris (France).
G. Dixmier, and G. Gerard. May 66, 75p
AGARD-524, AGARD-483
in French and English

Descriptors: *Composite material, *International cooperation, *Research project, *Standardization, Administration, Aluminum, Beryllium, Composite, Cooperation, Fiber, International, Material, Matrix, Mechanical, Phenol, Physical, Project, Property, Research, Resin, Silicon oxide, Wire.

For abstract, see STAR 05 18.
N67-32008 HC$3.00 MF$0.65

11F. Metallurgy and Metallography

MACHINING DATA FOR NUMERICAL CONTROL TURNING,
Metcut Research Associates, Inc., Cincinnati, Ohio.
For primary bibliographic entry see Field 13H.
AD-483 994 HC$3.00 MF$0.65

GRINDING RATIOS FOR AEROSPACE ALLOYS,
Metcut Research Associates, Inc., Cincinnati, Ohio.
Michael Field, and John F. Kahles. Jun 66, 24p
AFMDC-66-2
Contract AF 33 (615)-5262

Descriptors: (*Alloys, Tables), Grinding, Stainless steel, Heat-resistant metals + alloys, Steel, Hardening, Titanium alloys, Nickel alloys, Cobalt alloys, Refractory metal alloys.

Grinding Ratios (G Ratios) for aerospace alloys are presented in tabular form. Classes of alloys for which G values are given include alloy steels; ultra-high strength steels; tool steels; stainless steels, including precipitation hardening stainless steels; titanium alloys; nickel, cobalt, and iron base high temperature alloys, both wrought and cast; refractory alloys and important structural nonme-

tallic materials. All data are derived from controlled grinding tests.
AD-483 995 HC$3.00 MF$0.65

MACHINING DATA FOR BERYLLIUM METAL,
Metcut Research Associates, Inc., Cincinnati, Ohio.
For primary bibliographic entry see Field 13H.
AD-485 297 HC$3.00 MF$0.65

MACHINING DATA FOR NUMERICAL CONTROL FACE MILLING,
Metcut Research Associates, Inc., Cincinnati, Ohio.
For primary bibliographic entry see Field 13H.
AD-487 156 HC$3.00 MF$0.65

MACHINING DATA FOR NUMERICAL CONTROL DRILLING,
Metcut Research Associates, Inc., Cincinnati, Ohio.
For primary bibliographic entry see Field 13H.
AD-488 018 HC$3.00 MF$0.65

THE STUDY OF THE GROWTH MECHANISMS OF ALLOY FILAMENTARY CRYSTALS (WHISKERS) GROWN FROM SOLIDS.
California Univ Los Angeles Dept of Engineering
For primary bibliographic entry see Field 20B.
AD-655 917 HC$3.00 MF$0.65

EFFECT OF PRESSURE ON THE DIFFUSION OF Fe IN Ti + 10% Fe,
Illinois Univ Urbana Dept of Mining Metallurgy and Petroleum Engineering
R. F. Peart. 2 Jan 67, 8p
AFOSR-67-1769
Grant AF-AFOSR-633-64
Availability: Published in Phys. Stat Sol v20 p545-50 1967.

Descriptors: (*Iron, Diffusion), Titanium, Titanium alloys, Iron alloys, Hydrostatic pressure.

Measurements were made of the variation of the diffusion coefficient of Fe as a function of hydrostatic pressure in Ti at 902C and of Fe in Ti + 10% Fe at 808C. Hydrostatic pressures up to 4000 atm were used. For Ti + 10% Fe the diffusion coefficient decreases with pressure and corresponds to a value of 0.6 for the ratio of the activation volume to the atomic volume. For Ti the diffusion coefficient increases nonlinearly with pressure. These results are discussed in terms of diffusion due to vacancies, interstitials, and sub-grain boundary networks. (Author)
AD-655 996 Not available from CFSTI.

REMARKS ON THE RECENT LETTER 'OBSERVATION OF NAGAOKA'S BOUND STATE FOR CONDUCTION ELECTRONS IN DILUTE MAGNETIC ALLOYS',
California Univ San Diego La Jolla Dept of Physics
H. Suhl. 24 Mar 67, 3p
AFOSR-67-1754
Grant AF-AFOSR-610-67
Availability: Published in Physical Review Letters v18 n18 p743-4 May 1 1967.

Descriptors: (*Magnetic alloys, Transport properties), Theory, Resistance (Electrical).

The letter summarizes the current theoretical status of the anomalous transport properties of magnetic alloys. (Author)
AD-656 016 Not available from CFSTI.

A STUDY OF ALLOYING THEORY USING METASTABLE STRUCTURES.
Final rept. 1 Jun 66-1 Jun 67,
Franklin Inst Research Labs Philadelphia Pa
Rolf Stoering, and Hans Conrad. Jun 67, 73p
Rept no. F-C1869
Contract N00014-66-C-0231

Descriptors: (*Copper alloys, Phase studies), Zinc alloys, Silver alloys, Quenching (Cooling), Diffraction analysis, Electron microscopy, Heat treatment, Decomposition, Chemical precipitation, Phase diagrams, Annealing, Metallurgy.

The phases and structures of liquid quenched and vapor quenched Cu-Ag alloys and liquid quenched Cu-Zn alloys were investigated by x-ray and electron diffraction and by electron transmission microscopy. For the Cu-Ag alloys a single phase FCC random solid solution with a maximum deviation of about +1% from Vegard's law was only obtained for the thinnest regions (1000-3000 A) with a substrate temperature of -150 C. For the thicker regions and for higher substrate temperatures, segregated silver-rich FCC phases designated gamma double prime and alpha prime were obtained. The copper-rich beta prime phase was only observed for the highest substrate temperature of 50 C. A new hexagonal phase termed delta was found in very slight amounts in the liquid quenched Cu-Ag alloys. For the Cu-Zn alloys, the solubility of zinc in the alpha phase was increased to 48% by liquid quenching. Annealing of liquid quenched Cu50Ag50 alloys indicated the following sequence for the decomposition of the metastable phases: gamma prime (random) to gamma double prime (spinodal) to alpha prime (spinodal) to alpha prime + beta prime to alpha + beta (equilib.). (Author)
AD-656 051 HC$3.00 MF$0.65

MICROWAVE FLUX-GLOW DISSIPATION IN PARAMAGNETICALLY LIMITED Ti-V ALLOYS.
Doctoral thesis,
Massachusetts Inst of Tech Cambridge National Magnet Lab
W. H. Hackett, Jr., E. Maxwell, and Y. B. Kim.
5 May 67, 3p
AFOSR-67-1741
Contract F44620-67-C-0047
Prepared in cooperation with Bell Telephone Labs., Murray Hill, N. J.
Availability: Published in Physics Letters v24A n12 p663-4 Jun 5 1967.

Descriptors: (*Titanium alloys, *Resistance (Electrical)), (*Vanadium alloys, Measurement), Paramagnetic materials, Transition temperature, Superconductors, Low-temperature research, Microwave frequency, Electrical impedance, Superconductivity.

Flux - flow resistivities were measured for a series of Ti-V alloys by a microwave technique. Sharp transitions were observed for the strongly paramagnetically-limited alloys and interpreted in terms of a hard core model for the fluxoid structure. (Author)
AD-656 125 Not available from CFSTI.

A COMPARISON OF THE FATIGUE BEHAVIOUR OF TWO ALUMINUM-ZINC-MAGNESIUM ALLOYS.
Technical rept.,
Royal Aircraft Establishment Farnborough (England)
C. A. Stubbington, and P. J. E. Forsyth. Jun 66, 34p Rept no. RAE-TR-66201

Descriptors: (*Aluminum alloys, Fatigue (Mechanics)), (*Zinc alloys, Fatigue (Mechanics)), (*Magnesium alloys, Fatigue (Mechanics)), Deformation, Heat treatment, Crystal structure, Grain structures (Metallurgy), Grain boundaries, Crack propagation, Great Britain.
Identifiers: Aluminum alloy 2.5Mg 7.5Zn, Aluminum alloy 5Mg 4Zn.

The torsional fatigue deformation of two aluminium alloys, Al-7.5Zn-2.5Mg and Al-4Zn-5Mg, was examined in various conditions of heat treatment. Two well defined deformation modes were observed, one in which localised transcrystalline slip produced narrow zones of precipitate re-solution, and another in which localised deformation occurred in the precipitate depleted zones at the grain boundaries. An attempt was made to correlate the torsional deformation modes of the two alloys with the fracture modes observed on rotating bending corrosion fatigue test pieces. It was found that test pieces of the Al-7.5Zn-2.5Mg alloy, subjected to torsional fatigue in certain conditions of heat treatment, exhibited localized transcrystalline deformation and precipitate re-solution, and that rotating bending test pieces in these same conditions of heat treatment exhibited extensive shear mode crack growth when fatigued in aqueous 3% NaCl solution. In the Al-4Zn-5Mg alloy there was no correlation between localised transcrystalline torsional fatigue deformation and shear mode failure on rotating bending corrosion fatigue test pieces. In the latter alloy the grain boundaries exhibited a high corrosion susceptibility and the initial shear mode growth stage was replaced by intercrystalline crack growth. (Author)
AD-656 141 HC$3.00 MF$0.65

ALUMOWELD: A NEW BIMETALLIC WIRE FOR ELECTRICAL AND STRENGTH APPLICATIONS,
Copperweld Steel Co Glassport Pa
F. E. Leib. Dec 58, 11p
Annual Wire and Cable Symposium (7th), Asbury Park, N. J., 2-4 Dec 58.

Descriptors: (*Wire, Materials), (*Aluminum, Wire), (*Steel, Wire), Electric wire, Electric cables, Cables (Mechanical), Metallography, Industrial production, Electrical properties, Mechanical properties, Corrosion, Cladding.
Identifiers: Alumoweld.

A review is given of the development, production, properties, and applications of a proprietory bimetallic (aluminum-steel) wire.
AD-656 287 HC$3.00 MF$0.65

FORMATION OF ALKALI IRON SULFATES AND OTHER COMPOUNDS CAUSING CORROSION IN BOILERS AND GAS TURBINES.
Summary rept. no. 2, 1 Jan-30 Jun 67.
Battelle Memorial Inst Columbus Ohio Columbus Labs
30 Jun 67, 57p
Contract NObs-94516

Descriptors: (*Corrosive gases, *Sulfur compounds), (*Boilers, Corrosion), (*Gas turbines, Corrosion), Exhaust gases, Combustion products, Oxides, Tracer studies, Alkali metal compounds, Iron compounds, Sulfates, Analysis, Microscopy, Electrolytic cells, Deposits, Catalysts.
Identifiers: Sulfur dioxide, Sulfur trioxide.

The question of the relative importance of SO3 and of SO2 + O2 in flue gas in forming the complex sulfates that lead to corrosion has been answered by recent work with radioactive sulfur as a tracer. These test have shown that SO3 even in low concentrations is much more reactive. Additional measurements of the reaction of SO2 + O2 on catalytic surfaces now confirm that ample SO3 can be formed at the surface at a low gas velocity to account for the formation of the trisulfates. Such low gas velocities may exist on surfaces in boiler furnaces and gas turbines beneath layers of deposits. Trace amounts of trisulfates now can be detected by an optical technique, and also an electrochemical device was developed that appears capable of indicating the onset of corrosion within a few minutes after establishing corrosive conditions. (Author)
AD-656 366 HC$3.00 MF$0.65

MECHANISM OF FATIGUE OF COPPER AT INTERFACES.

Technical rept.,
Columbia Univ New York Inst for the Study of Fatigue and Reliability
R. G. Gates, and W. A. Wood. May 67, 144p
Rept no. TR-51
Contract Nonr-266 (91)

Descriptors: (*Composite materials, Fatigue (Mechanics)), (*Copper, Fatigue (Mechanics)), Interfaces, Electrodeposition, Metal coatings, Helium group gases, Reinforcing materials, Wire, Metallography, Deformation, Nickel, Gold, Chromium, Tungsten, Cracks.
Identifiers: Metal-matrix composites.

Studies are made of how torsion fatigue processes in pure copper with free surfaces differ (a) when the copper is covered with an electrodeposited coating (Ni, Cr, Au) and (b) when the copper contains embedded wires of tungsten as in a composite. The aim was to evaluate resulting fatigue performance from microstructural observations. Effects of coatings depend on fatigue amplitude, being in general deleterious at large amplitudes but inherently capable of effecting improvement at small amplitudes, especially if the coating is ductile as gold is. Embedded wires in the composites inevitably accentuated fatigue deformation and cracking of the copper matrix; but could lead to improved performance if used as crack stoppers. Examples of improved performance are given. (Author)
AD-656 427 HC$3.00 MF$0.65

FILTRATION OF ALUMINUM ALLOYS TO REDUCE OXIDE CONTENT.
Technical rept.,
Army Weapons Command Rock Island Ill Research and Engineering Div
R. B. Miclot. Jun 67, 26p
RIA-67-1507

Descriptors: (*Aluminum alloys, *Oxides), Castings, Metallurgy, Refractory metal alloys, Effectiveness, Graphite, Filters (Fluid), Purification, Tables.
Identifiers: Alloy 356.

Several refractory and metallic media were tested for effectiveness in removing aluminum oxide from molten aluminum casting alloys. A technique was used by which a metal sample could be melted, filtered, and cast entirely in a nitrogen atmosphere. Eleven filter materials in granular form were evaluated for two commercial alloys, 195 and 356. The aluminum oxide content of each alloy was determined before and after filtering by chemical analysis, using a procedure previously developed. Single filter packs of carborundum, porous graphite, or nonporous graphite decreased the oxide content of 195 alloy; magnesite, alundum, mullite, or porous graphite were most effective for alloy 356. (Author)
AD-656 456 HC$3.00 MF$0.65

FEASIBILITY STUDY OF THE FORMING OF DUCTILE IRON,
Frankford Arsenal Philadelphia Pa Ammunition Development and Engineering Labs
For primary bibliographic entry see Field 13H.
AD-656 457 HC$3.00 MF$0.65

EFFECT OF MOLD-STEEL INTERFACE REACTIONS ON CASTING SURFACE AND PROPERTIES.
Interim rept. 1 Jul 65-30 Sep 66,
Case Inst of Tech Cleveland Ohio Dept of Metallurgy
Rodney L. Naro, and John F. Wallace. 24 May 67, 73p
AMRA-CR-64-03/3
Contract DA-33-019-AMC-270 (Z)

Descriptors: (*Castings, *Steel), (*Mechanical properties, Steel), Roughness, Fractography, Surface properties, Fatigue (Mechanics), Tensile properties, Silicon dioxides, Zirconium oxides, Machining, Finishes + finishing, Microstructure, Refractory coatings, Statistical analysis, Tables.

The research investigated the effect of mold coatings and refractories on the surface quality of cast steel. The influence of surface roughness in reversed bending fatigue was also examined using as-cast specimens of AISI 4330 steel produced in green sand molds coated with hexachlorobenzene, aluminum powder, sodium floroaluminate, and a proprietary mold wash. Plate bending specimens were also produced in uncoated silica, chromite and zircon sand molds and subsequently tested. Test specimens made in both hexachlorobenzene coated silica sand molds and zircon sand produced equivalent results in improving the surface finish of experimental test castings. Bending fatigue test results showed that hexachlorobenzene coated and uncoated zircon provided the greatest overall improvement in fatigue life and endurance limit. The fatigue failures were initiated at cope surfaces with greater frequency than drag surfaces. (Author)
AD-656 475 HC$3.00 MF$0.65

CONTROL OF CAST GRAIN SIZE OF STEEL CASTINGS-EFFECT OF STRUCTURE AND NONMETALLICS ON PROPERTIES.
Interim rept. 1 Oct 65-30 Sep 66,
Case Inst of Tech Cleveland Ohio Dept of Metallurgy
Peter F. Wieser, and John F. Wallace. 12 May 67, 95p
AMRA-CR-64-04/3
Contract DA-33-091-AMC-273 (Z)

Descriptors: (*Castings, *Steel), (*Mechanical properties, Steel), Grain structures (Metallurgy), Ductility, Porosity, Microstructure, Dendritic structure, Tables, Non-metals, Tensile properties, Titanium, Measurement, Errors.

The relation of dendrite structure, nonmetallics and microporosity to solidification time and refinement by inoculation was investigated and correlated to mechanical properties of AISI 4335 steel castings. The dendrite spacing is determined by solidification time and significantly influenced by solute content. Titanium and boron effectively refine the secondary dendrite spacing; selenium tellurium and sulfur have the opposite effect. Titanium inoculation also nucleates equiaxed dendrites thereby reducing or eliminating the columnar dendritic structure. Increasing solidification time and amount or size of nonmetallics decrease the ductility. Improvements in ductility from grain refinement by either inoculation or shorter solidification time are caused by improved distribution or reduction of the size of nonmetallics. Microprobe analysis indicates no significant differences in the segregation behavior of the elements manganese and chromium from inoculation. A hypothesis concerning the formation of dendrite arms was postulated based upon measurements of solute distribution and existing theories of dendrite arm formation. (Author)
AD-656 476 HC$3.00 MF$0.65

THERMAL FATIGUE DAMAGE UNDER A TWO-STRAIN-BLOCK HISTORY.
Final rept. 1 Jul 63-1 Jul 67,
Seattle Univ Wash Dept of Mechanical Engineering
Harry Majors, Jr. Jun 67, 119p
AROD-4116:1-E
Contract DA-31-124-ARO (D)-145

Descriptors: (*Nickel, Fatigue (Mechanics)), Thermal stresses, Strain (Mechanics), Damage, Cracks, Plasticity, Compressive properties.

Thermal-strain fatigue, two block strain cycling, axial tension-compression tests were performed on thin-walled tubes of annealed, type 200 nickel to study the plastic strain damage process that leads to failure in the range of 10,000 to 100,000 cycles at a mean temperature of 580F under a frequency of 60-90 cycles per hour. Plastic strain ranges are in the order of twenty to forty per cent of the total strain range. All tests showed a transient period in the first 100 cycles prior to the stress-strain hysteresis loops stabilizing. A cumulative damage theory was developed which led to the relationship for a two-strain block history. (Author)
AD-656 481 HC$3.00 MF$0.65

ADVANTAGES AND LIMITATIONS OF INSULATED ALUMINUM WIRE AND CABLE. APPENDIX OF TABLES AND CHARTS,
Simplex Wire and Cable Co Cambridge Mass
R. E. Gross, G. A. Snow, and H. R. Stoddard. 1967, 7p

Descriptors: (*Electric wire, Aluminum), (*Electric cables, Aluminum), (*Aluminum, Wire), Copper, Lead, Cladding, Electric insulation, Electrical properties, Physical properties, Mechanical properties, Tables, Diagrams.

The physical, mechanical, and electrical properties of aluminum which are of principle interest to the wire and cable industry are presented in tabular and graphic form. Comparison is made, where applicable, to copper and lead.
AD-656 511 HC$3.00 MF$0.65

ELECTROSLAG REMELTING AND QUALITY OF METAL,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 13H.
AD-656 561 HC$3.00 MF$0.65

PRODUCTION OF WELDED TUBES FROM TITANIUM AND ITS ALLOYS,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 13H.
AD-656 566 HC$3.00 MF$0.65

STRESS-CORROSION STUDIES OF ALUMINUM ALLOY 5456-H321 IN SEAWATER.
Research and development rept.,
Naval Ship Research and Development Center Annapolis Md Annapolis Div
George A. Wacker. Jul 67, 27p
NSRDC-2436

Descriptors: (*Stress corrosion, *Aluminum alloys), Sea water, Cracks, Grain structures (Metallurgy), Photomicrography, Temperature, Surface properties, Thickness, Degradation, Environmental tests, Microstructure, Fracture (Mechanics).
Identifiers: Aluminum alloy 5456H321.

The stress-corrosion susceptibility of Aluminum Alloy 5456 in the H321 temper was investigated as a function of longitudinal, long transverse, and short transverse plate orientations. The alloy was found to be subject to pitting attack but immune to stress-corrosion cracking in flowing seawater at ambient temperature. (Author)
AD-656 573 HC$3.00 MF$0.65

EFFECT OF MEAN DEFLECTION ON THE LOW-CYCLE FLEXURAL FATIGUE BEHAVIOR OF ANNEALED 70-30 CUPRO-NICKEL.
Research and development rept.,
Naval Ship Research and Development Center Annapolis Md Annapolis Div
E. J. Czyryca, and R. C. Schwab. Jul 67, 26p
NSRDC-2445

Descriptors: (*Copper alloys, Fatigue (Mechanics)), (*Nickel alloys, Fatigue (Mechanics)), Flex-

ural strength, Deflection, Strain (Mechanics), Compressive properties, Annealing, Rolling (Metallurgy), Pipes.

Hot-rolled and annealed 70-30 Cupro-Nickel alloy was tested by completely reversed deflection and zero-to-maximum deflection cycling in the low-cycle fatigue range. It was found that the fatigue life is solely dependent on total strain range. Neither large-mean tensile strains nor compressive strains affect the low-cycle fatigue life. Post yield strain hardening is appreciably greater under cyclic conditions than under static bending or tension. (Author)
AD-656 574 HC$3.00 MF$0.65

IRRADIATION EFFECTS ON REACTOR STRUCTURAL MATERIALS.
Naval Research Lab Washington D C
For primary bibliographic entry see Field 18J.
AD-656 578 HC$3.00 MF$0.65

REPORT OF CORROSION TESTS AND ANALYSIS OF COMPACT HEAT EXCHANGERS,
Army Engineer Research and Development Labs Fort Belvoir Va
For primary bibliographic entry see Field 13A.
AD-656 617 HC$3.00 MF$0.65

STRENGTH OF SINTERED FERROUS PARTS WITH INTERCONNECTED POROSITY.
Summary rept. 1 Jul 66-29 Jun 67.
IIT Research Inst Chicago Ill
27 Jul 67, 89p Rept no. IITRI-B6068-12
Contract DA-36-038-AMC-4333 (A)

Descriptors: (*Sintering, *Iron), (*Powder metals, *Physical properties), Fracture (Mechanics), Hardness, Tensile properties, Compacting, Density, Pressure, Grain size, Porosity, Computer programs, Oxygen, Temperature, Elongation, Photographs.

A study of nine independent variables contributing to physical properties in sintered porous ferrous parts was made. A statistically designed experiment was utilized and the data analyzed through a computer program; an electrosketch attachment to the computer was used to obtain graphical presentation of the results. It was possible through proper combination of variables to obtain an ultimate tensile strength of 24,600 psi and 7% elongation in a specimen with 25% porosity and 19,600 psi UTS and 9% elongation in a specimen with 30% porosity. The most significant factors affecting ultimate tensile strength and elongation are shape, density, sintering temperature and time, and pressing rate. In addition, sintering atmosphere has a strong influence on elongation alone. Dimensional change is most significantly affected by sintering temperature, time and atmosphere, particle shape, and pressing rate. (Author)
AD-656 622 HC$3.00 MF$0.65

EARLY STAGES OF SPINODAL DECOMPOSITION IN AN ALUMINUM-ZINC ALLOY,
Northwestern Univ Evanston Ill Dept of Materials Science
K. B. Rundman, and J. E. Hilliard. 17 Oct 66, 13p
AROD-4975:4-MC
Contract DA-31-124-ARO (D)-233
Prepared in cooperation with Michigan Technological Univ., Houghton, Dept. of Mechanical Engineering.
Availabilfty: Published in Acta Metallurgica v15 p1025-33 Jun 1967.

Descriptors: (*Aluminum alloys, Decomposition), (*Zinc alloys, Decomposition), Solid solutions, Spinels, X-ray spectroscopy, Diffusion, Thermodynamics.
Identifiers: Aluminum alloy 22Zn.

A small-angle X-ray scattering study was made of isothermal decomposition in an Al-Zn alloy containing 22 at.%Zn. The changes in the X-ray spectra in the early stages of the decomposition at 65C were in accord with the theory of spinodal decomposition proposed by J. W. Cahn (Acta Met. v9 p795 1961). The diffusion coefficient derived from the kinetics agreed with an extrapolation of high-temperature data and the measured value of the gradient-energy coefficient was (16 +3 or -3 x 0.000001 erg/cm). (Author)
AD-656 666 Not available from CFSTI.

CORRELATIONS BETWEEN FLEXURAL AND DIRECT STRESS LOW-CYCLE FATIGUE TESTS.
Research and development rept.,
Naval Ship Research and Development Center Annapolis Md Annapolis Div
M. R. Gross, and E. J. Cryryca. Aug 67, 22p
NSRDC-2460

Descriptors: (*Fatigue (Mechanics), Test methods), Flexural strength, Copper alloys, Nickel alloys, Aluminum alloys, Bronze, Tests, Stresses, Steel.
Identifiers: Steel HY-100, Steel HY-140, Monel 400 (Alloys), Cast and wrought 70-30 (Alloys).

Flexural and direct stress low-cycle fatigue results for six materials are compared. The materials are HY-100 and HY-140 steels, Monel-400, cast and wrought 70-30 cupronickel, and Ni-Al bronze. It is concluded that the two methods of test give equivalent results within the life range investigated when correlated on a total strain range basis. Correlations based on nominal stress are not as good because of differences between the cyclic stress-strain relationships for the two types of tests. (Author)
AD-656 746 HC$3.00 MF$0.65

EXPERIMENTS WITH LIQUID AND SOLID CESIUM ON A RHENIUM SUBSTRATE,
General Electric Co Schenectady N Y Research and Development Center
Harold F. Webster. Jul 67, 20p Rept no. Scientific-1, S-67-1065
AFCRL-67-0334
Contract AF 19 (628)-4339

Descriptors: (*Cesium, Vapor plating), (*Rhenium, Surface properties), Metal films, Epitaxial growth, Liquid metals, Crystal structure, Grain structures (Metallurgy), Substrates.

Cesium metal was deposited from the vapor on a large-grained rhenium substrate. Both the wetting of the substrate by the cesium and the mode of growth of solid films of cesium are dependent upon the crystal face exposed by the various grains of rhenium. The experiment was done in a sealed-off glass tube which had a residual gas pressure of 10 to the -9th power torr before cesium was admitted. Both the wetting and the mode of film growth were dependent upon monolayer amounts of impurities. Epitaxial relationships were observed to exist between many of the rhenium grains and the deposited cesium. (Author)
AD-656 777 HC$3.00 MF$0.65

MACHINING DATA FOR NUMERICAL CONTROL PERIPHERAL END MILLING,
Metcut Research Associates, Inc., Cincinnati, Ohio.
For primary bibliographic entry see Field 13H.
AD-800 227 HC$3.00 MF$0.65

MACHINING DATA FOR NUMERICAL CONTROL END MILL SLOTTING,
Metcut Research Associates, Inc., Cincinnati, Ohio.
For primary bibliographic entry see Field 13H.
AD-800 228 HC$3.00 MF$0.65

MACHINING DATA FOR NUMERICAL CONTROL TAPPING,
Metcut Research Associates, Inc., Cincinnati, Ohio.
For primary bibliographic entry see Field 13H.
AD-803 041 HC$3.00 MF$0.65

MACHINING DATA FOR NUMERICAL CONTROL REAMING,
Metcut Research Associates, Inc., Cincinnati, Ohio.
For primary bibliographic entry see Field 13H.
AD-803 042 HC$3.00 MF$0.65

MACHINING DATA FOR NUMERICAL CONTROL,
Metcut Research Associates, Inc., Cincinnati, Ohio.
For primary bibliographic entry see Field 13H.
AD-803 763 HC$3.00 MF$0.65

PLANE SHOCK WAVES IN METALS AND HETEROGENEOUS MATERIALS.
Picatinny Arsenal, Dover, N. J. Feltman Research Labs.
For primary bibliographic entry see Field 20K.
AD-811 215 HC$3.00 MF$0.65

LABORATORY INVESTIGATIONS IN SUPPORT OF FLUID-BED FLUORIDE VOLATILITY PROCESSES. PART XIV. THE CORROSION OF NICKEL AND NICKEL ALLOYS BY FLUORINE, URANIUM HEXAFLUORIDE, AND SELECTED VOLATTLE FISSION PRODUCT FLUORIDES AT 500 DEGREES C,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 15.
ANL-7241 HC$3.00 MF$0.65

STUDIES IN ZIRCONIUM OXIDATION,
Argonne National Lab., Ill.
J. Levitan, J. E. Draley, and C. J. Van Drumen.
Dec 66, 25p
Contract W-31-109-eng-38

Descriptors: (*Zirconium, *Oxidation), (*Reactor materials, *Metallurgy), Phase studies, Water vapor, Nitrogen, Carbon dioxide, Oxygen, Oxides, Low-pressure research, Control.

For abstract, see NSA 21 15.
ANL-7252 HC$3.00 MF$0.65

DEVELOPMENT OF PHASE EQUILIBRIUM DIAGRAMS FOR THE TITANIUM-RICH PORTIONS OF THE TERNARY SYSTEMS Ti-Mn-Al, Ti-Cr-Mo, AND Ti-Mn-Mo.
Interim technical rept. no. 3, 1 Jun-1 Sep 52.
Armour Research Foundation, Chicago, Ill.
1 Sep 52, 30p
Contract DA-11-022-ORD-272

Descriptors: (*Titanium alloys, *Phase diagrams), Manganese alloys, Chromium alloys, Aluminum alloys, Molybdenum alloys, Phase studies, Intermetallic compounds, Grain structures (Metallurgy).

The phase boundaries of the solid state in the system titanium-chromium-molybdenum were rechecked at critical points. A high temperature allotropic modification of the phase TiCr2 was identified. The C/alpha + beta surface in the system titanium-maganese-molybdenum was mapped. The manganese-rich portion of the binary titanium-manganese system was found to require re-investigation. Several isothermal sections and vertical sections of the system titanium-aluminum-manganese are presented. (Author)
ATI-171 213 HC$3.00

AN EVALUATION OF UC-PUC FOR SODIUM-COOLED FAST REACTORS,
Battelle Memorial Inst., Columbus, Ohio.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 15.
BMI-1799 HC$3.00 MF$0.65

SHEAR STRENGTH OF SOFT-SOLDERED BRASS JOINTS AS A FUNCTION OF AGE AND TEMPERATURE HISTORY,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 13-.
For abstract, see NSA 21 15.
LA-3658 HC$3.00 MF$0.65

PROJECTILE SIZE EFFECTS ON HYPERVELOCITY IMPACT CRATERS IN ALUMINUM.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
For primary bibliographic entry see Field 20K.
For abstract, see STAR 05 18.
N67-31538 HC$3.00 MF$0.65

EFFECT OF INITIAL LOADS AND OF MODERATELY ELEVATED TEMPERATURE ON THE ROOM-TEMPERATURE FATIGUE LIFE OF TI-8 AL-1 MO-1 V TITANIUM- ALLOY SHEET.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 20K.
For abstract, see STAR 05 18.
N67-31539 HC$3.00 MF$0.65

DEVELOPMENT OF DISPERSION STRENGTHENED CHROMIUM ALLOYS SUMMARY REPORT.
General Technologies Corp., Alexandria, Va.
E. F. Abrams, J. A. Alexander, R. G. Shaver, and J. C. Withers. 15 Mar 67, 42p NASA-CR-54610
Contract NAS3-7606

Descriptors: *Chromium alloy, *Dispersion hardening, Alloy, Aqueous, Chromium, Development, Dispersion, Electrodeposition, Hardening, Impurity, Interstitial, Microstructure, Nitrogen, Oxygen, Preparation, Salt, Technique.

For abstract, see STAR 05 18.
N67-32158 HC$3.00 MF$0.65

THE MECHANICS OF REPEATED DISCONTINUOUS YIELDING OF METALS.
Israel Inst. of Tech., Haifa. Material Mechanics Lab.
S. R. Bodner. Mar 67, 50p MML-6, SR-4
Contract AF 61/052/-951

Descriptors: *Aluminum, *Dislocation, *Yield strength, Aging, Deformation, Discontinuity, Flow, Hardening, Metal, Serratia, Strain, Strength, Stress, Transformation, Wave, Yield.

For abstract, see STAR 05 18.
N67-32192 HC$3.00 MF$0.65

A STUDY OF HYDROGEN EMBRITTLEMENT OF VARIOUS ALLOYS ANNUAL SUMMARY REPORT, 24 JUN. 1966 - 23 JUN. 1967.
Battelle Memorial Inst., Columbus, Ohio.
A. R. Elsea, E. E. Fletcher, and T. P. Groeneveld. 23 Jun 67, 83p NASA-CR-86675
Contract NAS8-20029

Descriptors: *Aluminum alloy, *Embrittlement, *Hydrogen, *Maraging steel, *Stainless steel, Alloy, Aluminum, Cleaning, Corrosion, Cracking, Electroplating, Evaluation, Maraging, Pickling, Process, Relief, Resistance, Stainless, Steel, Titanium, Treatment, Vanadium.

For abstract, see STAR 05 18.
N67-32396 HC$3.00 MF$0.65

DISPERSION CHROMIUM PRODUCT SUMMARY REPORT.
Melpar, Inc., Falls Church, Va.
N. Fuschillo, and M. L. Gimpel. Mar 67, 27p
NASA-CR-54612, REPT.-5360
Contract NAS3-7608

Descriptors: *Chromium alloy, *Precipitation hardening, *Production engineering, *Vapor deposition, Alloy, Carbon, Chlorine, Chromium, Coating, Deposition, Dispersion, Engineering, Evaporation, Hardening, Magnesium, Metal, Method, Oxide, Particle, Precipitation, Production, Vapor.

For abstract, see STAR 05 18.
N67-32530 HC$3.00 MF$0.65

INVESTIGATION OF BIAXIAL STRESS CORROSION IN TWO ALLOY FINAL REPORT, 29 JUN. 1966 - 28 MAY 1967.
Rocketdyne, Canoga Park, Calif.
A. J. Jacobs. 19 Jun 67, 49p NASA-CR-65646, R-7102
Contract NAS9-6324

Descriptors: *Aluminum alloy, *Stainless steel, *Stress corrosion, Alloy, Aluminum, Biaxis, Boiling, Chloride, Corrosion, High temperature, Loading, Magnesium, Resistance, Room, Sodium, Solution, Stainless, Steel, Stress, Temperature, Tension, Transverse.

For abstract, see STAR 05 18.
N67-32634 HC$3.00 MF$0.65

DISLOCATION STRUCTURES IN SLIGHTLY STRAINED TUNGSTEN AND TUNGSTEN-RHENIUM AND TUNGSTEN-TANTALUM ALLOYS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
J. R. Stephens. Aug 67, 21p NASA-TN-D-4094
Contract 129-03-02-05-22

Descriptors: *Deformation, *Electron microscopy, *Rhenium alloy, *Tantalum alloy, *Tungsten alloy, Alloy, Electron, Microscopy, Polycrystal, Rhenium, Strain, Structure, Tantalum, Transmission, Tungsten.

For abstract, see STAR 05 18.
N67-32639 HC$3.00 MF$0.65

CORROSION OF BORON-STAINLESS STEEL BY NITRIC ACID,
Dow Chemical Co., Golden, Cold. Rocky Flats Div.
D. S. Irwin. 22 Jul 66, 14p
Contract AT (29-1)-1106

Descriptors: (*Corrosion, *Boron), (*STAINLESS STEEL, Nitric acid), Preparation, Thickness, Chemical analysis.

For abstract, see NSA 21 15.
RFP-781 HC$3.00 MF$0.65

PURIFICATION AND CRYSTALLIZATION OF AMORPHOUS BORON POWER RECOVERY AND PURIFICATION OF BORON FROM RESUDIES AND SCRAP.
Technical rept, 1 Jul-31 Dec 66,
Eagle-Picher Industries, Inc., Miami, Okla. Miami Research Labs.
John R. Musgrave, Ralph J. Starks, Harold E. Erwin, and George E. Biggerstaff. 15 Jan 67, 45p
Contract AT (40-1)-3327

Descriptors: (*Boron, Purification), (*Powder metallurgy, Recovery), Crystallization, Distillation, Reduction, Removal.

For abstract, see NSA 21 15.
TID-23704 HC$3.00 MF$0.65

PRESSURIZED WATER REACTOR (PWR) PROJECT. TECHNICAL PROGRESS REPORT FOR THE PERIOD JANUARY 21, 1967 TO APRIL 21, 1967.
Technical progress rept.
Bettis Atomic Power Lab., Pittsburgh, Pa.
1967, 90p
Contract AT (11-1)-GEN-14
Jan-21 Apr 67.

Descriptors: (*Pressurized water reactors, Reports), (*Reactor cores, Nuclear engineering).

For abstract, see NSA 21 15.
WAPD-MRP-120 HC$3.00 MF$0.65

11G. Miscellaneous Materials

AN ENVIRONMENTAL HIGH PERFORMANCE, RUGGED SILICONE CABLE DESIGN FOR MISSILE APPLICATION,
Picatinny Arsenal Dover N J Army Explosive Ordnance Disposal Center
For primary bibliographic entry see Field 9A.
AD-656 063 HC$3.00 MF$0.65

THE EFFECTS OF SPACE ENVIRONMENTS ON INSULATION OF TEFLON (TRADE NAME) TFE AND FEP RESINS,
Du Pont de Nemours (E I) and Co Wilmington Del Plastics Dept
For primary bibliographic entry see Field 11I.
AD-656 064 HC$3.00 MF$0.65

SOLID POLYPROPYLENE INSULATION FOR WIRE AND CABLE APPLICATIONS,
United States Steel Corp Worcester Mass American Steel and Wire Div
For primary bibliographic entry see Field 11I.
AD-656 078 HC$3.00 MF$0.65

THE ELECTRICAL CONDUCTANCE OF CARBON BLACK,
Huber (J M) Corp Borger Tex
Andries Voet. 1963, 26p
Prepared for presentation at the Annual Wire and Cable Symposium (12th) Asbury Park, N. J., 4-6 Dec 1963.

Descriptors: (*Carbon black, Electrical conductance), Resistance (Electrical), Additives, Elastomers, Plastics, Tunneling (Electronics), Oxides, Vulcanizates, Particle size, Porosity, Moisture-proofing, Reinforcing materials.

The electrical properties of elastomers and plastics are significantly affected by the presence of the conductive reinforcing carbon black particles. A study of the resistance of carbon black indicates that the relation between logarithm of resistance and cube root of specific volume is linear over the entire range investigated. Most lines intersect by extrapolation in a single point, corresponding to an open packing at the resistance of solid carbon, independent of the presence of particle chains. These results are incompatible with a through-going path concept of electrical conductance. It is shown that field emission and electron tunneling through gaps accounts quantitatively for the observed phenomena. The influence of particle size, porosity and structure as well as the effect of surface oxygen complexes of the blacks has been assessed. It appears that the presence of carboxyl groups on the carbon black surface imparts a high electrical resistance to a vulcanizate. Chemical

modification of the carbon black surface may lead to highly electrically insulating and completely water-resistant vulcanizates. (Author)
AD-656 094 HC$3.00 MF$0.65

WIRE AND CABLE INSULATION PROBLEMS OF SPACE VEHICLES,
Lockheed Missiles and Space Co Sunnyvale Calif
Lawrence D. Walker. 1963, 8p
Prepared for presentation at Wire and Cable Symposium (12th) held at Asbury Park, N. J., 4-6 Dec 1963.

Descriptors: (*Electric insulation, Spacecraft), Electric wire, Electric cables, Polyethylene plastics, Mica, Halocarbon plastics, Silicone plastics, Polyamide plastics, Effectiveness, Radiation damage, Electrical properties.

The needs for a satisfactory insulation are: (a) It must be able to resist radiation. (b) Future orbits will require long time exposure to gamma rays, neutron, and proton exposure. (c) Returning signals must be clear, and to keep lenses clear the insulation must be free from causes of smoking and outgassing. (d) Temperature requirements will be greater, and the insulation must be able to meet abnormal low temperatures as well. (e) The manufacturing and assembly of flight items demands an insulation that will stand up against the handling of all degrees of experience of help. (f) Electrical properties must be maintained and improved. (g) The weight of the insulation must be considered. A light weight insulation means that payloads can be increased. (Author)
AD-656 096 HC$3.00 MF$0.65

THE MODIFICATION OF BUTYL RUBBER WITH POLYETHYLENE FOR WIRE AND CABLE,
Polymer Corp Ltd Sarnia (Ontario)
For primary bibliographic entry see Field 11J.
AD-656 102 HC$3.00 MF$0.65

POLYESTER FILM LAMINATES FOR WIRE INSULATION,
Gore (W L) and Associates Inc Newark Del
For primary bibliographic entry see Field 11I.
AD-656 106 HC$3.00 MF$0.65

THE CHARACTERISTICS OF KYNAR POLYVINYLIDENE FLUORIDE AS AN INSULATING MATERIAL,
Pennsalt Chemicals Corp Philadelphia Pa
For primary bibliographic entry see Field 11I.
AD-656 107 HC$3.00 MF$0.65

ETHYLENE PROPYLENE COPOLYMER PROVIDES A VERSATILE AND STABLE INSULATION,
Enjay Labs Linden N J
For primary bibliographic entry see Field 11I.
AD-656 109 HC$3.00 MF$0.65

CELLULAR POLYPROPYLENE INSULATION,
Hercules Powder Co Wilmington Del
For primary bibliographic entry see Field 11I.
AD-656 110 HC$3.00 MF$0.65

PROPYLENE-BASED COPOLYMERS IN WIRE AND CABLE APPLICATIONS,
Avisun Corp Philadelphia Pa
For primary bibliographic entry see Field 11I.
AD-656 111 HC$3.00 MF$0.65

'EUROPA' CABLE,
Societe Anonyme de Telecommunications Paris (France)
For primary bibliographic entry see Field 9A.
AD-656 113 HC$3.00 MF$0.65

THE SIGNIFICANCE OF ACCELERATED AGING TESTING OF RUBBER INSULATION,
Anaconda Wire and Cable Co Marion Ind
For primary bibliographic entry see Field 11J.
AD-656 115 HC$3.00 MF$0.65

EVALUATING CHEMICALLY CROSSLINKED POLYETHYLENES,
General Electric Co Bridgeport Conn Wire and Cable Dept
For primary bibliographic entry see Field 11I.
AD-656 116 HC$3.00 MF$0.65

A NEW APPROACH TO COMPOUNDING FOR HIGH TEMPERATURE VINYL WIRE INSULATION,
Thompson Chemical Co Pawtucket R I
For primary bibliographic entry see Field 11I.
AD-656 164 HC$3.00 MF$0.65

CELLULAR INSULATION FOR COMMUNICATIONS CABLE,
Union Carbide Corp New York Plastics Div
For primary bibliographic entry see Field 11I.
AD-656 169 HC$3.00 MF$0.65

THE INFLUENCE OF EXTRUDER GEOMETRY IN THE PRODUCTION OF HOMOGENEOUS CELLULAR PLASTIC INSULATION,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 13H.
AD-656 170 HC$3.00 MF$0.65

ELECTRICAL FATIGUE AND DIELECTRIC STRENGTH IN TEFLON TFE INSULATION,
Brand-Rex Div Willimantic Conn
For primary bibliographic entry see Field 11I.
AD-656 171 HC$3.00 MF$0.65

FACTORS INFLUENCING ACCELERATED OZONE TESTING AND WEATHERING OF CABLE COMPOSITIONS,
Battelle Memorial Inst Columbus Ohio
For primary bibliographic entry see Field 11C.
AD-656 172 HC$3.00 MF$0.65

SILICONE RUBBER GRADED CONSTRUCTION FOR HIGH VOLTAGE INSULATION,
Dow Corning Corp Midland Mich
For primary bibliographic entry see Field 9A.
AD-656 174 HC$3.00 MF$0.65

NEW FLUOROCARBON INSULATION COMPOUNDS,
Gore (W L) and Associates Inc Newark Del
For primary bibliographic entry see Field 11I.
AD-656 187 HC$3.00 MF$0.65

SOME RECENT STUDIES OF ELECTRICAL GRADE FILLERS IN BUTYL RUBBER AND OTHER INSULATION MATERIALS,
Enjay Labs Linden N J
For primary bibliographic entry see Field 11J.
AD-656 191 HC$3.00 MF$0.65

NEW LOW-LOSS 'BALLOON' TYPE POLYETHYLENE INSULATION FOR TELECOMMUNICATION CABLES,
Societe Anonyme de Telecommunications Paris (France)
Georges Fuchs, and Paul Verges. 1960, 9p
Annual Wire and Cable Symposium (9th), on Technical Progress in Communication, Asbury Park, N. J., Nov. 30, Dec 1-2, 1960.

Descriptors: (*Polyethylene plastics, *Electric insulation), France, Extrusion, Dielectric properties, Electric cables, Communication equipment, Capacitance, Plastic coatings.

The present paper describes a process developed several years ago, and which ensures very low permittivity factors hand in hand with high dielectric strength and good mechanical resistance. Process control is easy and accurate, and uniform results can be obtained throughout an indefinte series of batches. The insulation obtained is referred to in France as 'tubular balloon insulation' or more briefly, 'balloon insulation'. The term is descriptive of the final result, which is reminiscent of a string of small balloons attached together. The insulation is attained by extrusion around the conductor of a polyethylene tube with an inner diameter that is greater than the wire section; the conductor is centered in the tube by 'crimps' at regular intervals.
AD-656 195 HC$3.00 MF$0.65

HEAT AGING STUDIES OF CHEMICALLY CROSS-LINKED POLYETHYLENE,
Union Carbide Corp New York Plastics Div
For primary bibliographic entry see Field 11I.
AD-656 196 HC$3.00 MF$0.65

HIGH DENSITY POLYETHYLENE INSULATION IN COMMUNICATION CABLES,
Plastic Wire and Cable Corp Jewett City Conn
For primary bibliographic entry see Field 9A.
AD-656 197 HC$3.00 MF$0.65

POLYMER REQUIREMENTS AND INSULATING TECHNIQUES FOR OBTAINING THE MAXIMUM BENEFITS OF HIGH DENSITY POLYETHYLENE,
Goodrich-Gulf Chemicals Inc Cleveland Ohio
For primary bibliographic entry see Field 11I.
AD-656 216 Not available from CFSTI.

AN EVALUATION OF HEAT STABILIZED, FLAME-RETARDED, CROSS-LINKED POLYOLEFINS FOR ELECTRONIC WIRE AND CABLE APPLICATIONS.
Raychem Corp Redwood City Calif
For primary bibliographic entry see Field 11I.
AD-656 226 HC$3.00 MF$0.65

EXPERIMENTAL RESULTS OF CELLULAR DIELECTRICS FOR TELECOMMUNICATION CABLES,
Pirelli Spa Milan (Italy)
For primary bibliographic entry see Field 9A.
AD-656 229 HC$3.00 MF$0.65

USE AND ABUSE OF PLASTIC INSULATION AND JACKETS,
Hydro-Electric Power Commission of Ontario (Canada)
For primary bibliographic entry see Field 9A.
AD-656 231 HC$3.00 MF$0.65

NEW INSULATION APPLICATIONS OF HIGH-DENSITY POLYETHYLENE AND POLYPROPYLENE,
Hercules Powder Co Wilmington Del
For primary bibliographic entry see Field 11I.
AD-656 234 HC$3.00 MF$0.65

BUTYL INSULATION,
Esso Research and Engineering Co Linden N J
For primary bibliographic entry see Field 11I.
AD-656 253 HC$3.00 MF$0.65

IRRATHENE 201 IRRADIATED POLYETHYLENE: A NEW CABLE INSULATION,
General Electric Co Pittsfield Mass

For primary bibliographic entry see Field 11I.
AD-656 261 HC$3.00 MF$0.65

THE EFFECTS OF CONDUCTOR TEMPERATURE ON THE QUALITY OF EXTRUDED VINYL WIRE INSULATION,
Bakelite Co Bound Brook N J
For primary bibliographic entry see Field 13H.
AD-656 266 HC$3.00 MF$0.65

KEL-F (TRADE NAME) ELASTOMER: A NEW MATERIAL FOR THE ELECTRICAL INDUSTRY,
Kellogg (M W) Co Jersey City N J
For primary bibliographic entry see Field 11I.
AD-656 269 HC$3.00 MF$0.65

COLD GR-S POLYMERS FOR WIRE INSULATION,
United States Rubber Co Naugatuck Conn Chemical Div
For primary bibliographic entry see Field 11J.
AD-656 271 HC$3.00 MF$0.65

BUTYL POLYMER COMPOUNDING FOR INSULATIONS,
Southern Clays Inc New York
For primary bibliographic entry see Field 11J.
AD-656 272 HC$3.00 MF$0.65

AN EVALUATION OF VINYL HOOK-UP WIRES,
Brand-Rex Div Willimantic Conn
For primary bibliographic entry see Field 9A.
AD-656 273 HC$3.00 MF$0.65

ENJAY BUTYL IN LOW VOLTAGE APPLICATIONS,
Enjay Labs Linden N J
For primary bibliographic entry see Field 11J.
AD-656 284 HC$3.00 MF$0.65

DEVELOPMENT AND APLLICATION NOTES ON 'THIN-WALL' TEFLON INSULATED WIRE AND CABLE,
Inso Electronic Products Inc Nutley N J
For primary bibliographic entry see Field 9A.
AD-656 292 HC$3.00 MF$0.65

RODENT ATTACK ON RUBBER- AND PLASTIC-INSULATED WIRES AND CABLES,
Sieverts Kabelverk Ab Sundbyberg (Sweden)
For primary bibliographic entry see Field 9A.
AD-656 295 HC$3.00 MF$0.65

STATUS OF POLYMONOTRIFLUOROCHLOROETHYLENE INSULATED WIRE,
Brand-Rex Div Willimantic Conn
For primary bibliographic entry see Field 9A.
AD-656 319 HC$3.00 MF$0.65

LAYTEX INSULATION FOR COMMUNICATION AND CONTROL CABLES,
United States Rubber Co Bristol R I Bristol Plant
For primary bibliographic entry see Field 11J.
AD-656 321 HC$3.00 MF$0.65

HIGH VOLTAGE - HIGH TEMPERATURE RUBBER INSULATION,
Simplex Wire and Cable Co Cambridge Mass
For primary bibliographic entry see Field 11J.
AD-656 322 HC$3.00 MF$0.65

PROPERTIES OF PLASTICIZERS AND THEIR RELATION TO ELECTRICAL COMPOUNDING,
Bakelite Co New York
For primary bibliographic entry see Field 11I.
AD-656 323 HC$3.00 MF$0.65

BAKELITE CELLULAR POLYETHYLENE,
Bakelite Co Bound Brook N J
For primary bibliographic entry see Field 11I.
AD-656 324 HC$3.00 MF$0.65

MINERAL INSULATED WIRING,
General Cable Corp Bayonne N J
For primary bibliographic entry see Field 9A.
AD-656 327 HC$3.00 MF$0.65

COMPOUNDING OF G.E. ELECTRICAL GRADE SILICONE RUBBER.
General Electric Co Schenectady N Y
For primary bibliographic entry see Field 11I.
AD-656 328 HC$3.00 MF$0.65

A USER'S VIEW OF PLASTIC INSULATED CONDUCTORS IN OUTSIDE TELEPHONE PLANT,
Michigan Bell Telephone Co Detroit
For primary bibliographic entry see Field 17B.
AD-656 372 HC$3.00 MF$0.65

CHEMICALLY CROSS-LINKED POLYETHYLENE,
General Electric Co Bridgeport Conn Wire and Cable Dept
For primary bibliographic entry see Field 11I.
AD-656 390 HC$3.00 MF$0.65

HIGH-TEMPERATURE AIRCRAFT WIRES,
General Electric Co Bridgeport Conn
For primary bibliographic entry see Field 9A.
AD-656 403 HC$3.00 MF$0.65

THE TESTING OF POLYVINYLCHLORIDE ELECTRICAL FORMULATIONS,
Monsanto Chemical Co St Louis Mo
For primary bibliographic entry see Field 11I.
AD-656 404 HC$3.00 MF$0.65

LOW LOSS CABLE FOR MICROWAVE SERVICE,
ITT Federal Labs Nutley N J
For primary bibliographic entry see Field 9A.
AD-656 408 HC$3.00 MF$0.65

COMPOUND FOR HEAT RESISTANT INSULATIONS AND JACKETS,
Vanderbilt (R T) Co Inc East Norwalk Conn Rubber Div
For primary bibliographic entry see Field 11J.
AD-656 414 HC$3.00 MF$0.65

THE INTERRELATIONSHIP BETWEEN DENSITY AND DIELECTRIC STRENGTH OF HIGH PRESSURE POLYETHYLENE FOR HIGH VOLTAGE APPLICATIONS IN INSULATED WIRES,
Royal Electric Corp Pawtucket R I
For primary bibliographic entry see Field 11I.
AD-656 418 HC$3.00 MF$0.65

THE EXTRUSION OF 'TEFLON' 100X PERFLUROCARBON RESIN: A NEW MELT EXTRUDABLE MATERIAL FOR WIRE INSULATION,
Du Pont de Nemours (E I) and Co Wilmington Del Polychemicals Dept
For primary bibliographic entry see Field 13H.
AD-656 423 HC$3.00 MF$0.65

THE EFFECT OF CARBON BLACK SURFACE PROPERTIES ON THE STABILITY OF POLYETHYLENE,
Acheson Dispersed Pigments Co Philadelphia Pa
John T. Moynihan. 1956, 13p
Prepared for presentation at the Annual Wire and Cable Symposium (5th), Asbury Park, N. J., December 4, 1956.

Descriptors: (*Carbon black, Weatherproofing), (*Electric cables, Plastic coatings), (*Polyethylene plastics, Stability), Surface properties, Light, Absorption, Oxygen, Degradation.

Carbon black has been found to be the most effective stabilizer for polyethylene plastic with respect to degradation due to light and weathering. This stability is very important when the material is subjected to exposure to sunlight and weathering over long periods of time such as in electrical cable sheathing applications and in plastic pipe. A study of the interrelation between the plastic and the carbon black surface is important so that future increases in stability may result. For example, the distribution of the carbon black surface within the polyethylene mass is an important consideration for stability.
AD-656 501 HC$3.00 MF$0.65

SOME CONSIDERATIONS ON THE USE OF HIGH DENSITY POLYTHENE IN THE CABLE INDUSTRY,
Imperial Chemical Industries Ltd Wellwyn Garden City (England) Plastics Div
For primary bibliographic entry see Field 11I.
AD-656 502 HC$3.00 MF$0.65

'KEL-F' 500, A NEW FLUOROCARBON WIRE INSULATING MATERIAL,
Kellogg (M W) Co Jersey City N J
For primary bibliographic entry see Field 11I.
AD-656 504 HC$3.00 MF$0.65

NEW DEVELOPMENTS IN SILICONE RUBBER FOR ELECTRICAL TAPES,
General Electric Co Waterford N Y Silicone Prots Dept
For primary bibliographic entry see Field 11I.
AD-656 505 HC$3.00 MF$0.65

RESISTANCE OF RUBBER COVERED CABLE, JACKET, AND INSULATION STOCKS TO WEATHER AND ARTIFICIAL AGING,
Army Engineer Research and Development Labs Fort Belvoir Va
For primary bibliographic entry see Field 9A.
AD-656 516 HC$3.00 MF$0.65

NEW DEVELOPMENTS IN SILICONE RUBBER COMPOUNDS FOR EXTRUDED ELECTRICAL INSULATION,
General Electric Co Waterford N Y Silicone Products Dept
For primary bibliographic entry see Field 11I.
AD-656 518 HC$3.00 MF$0.65

NEW DEVELOPMENTS IN CABLE JACKETING COMPOUNDS,
Bakelite Co New York
For primary bibliographic entry see Field 11I.
AD-656 521 HC$3.00 MF$0.65

THE USE OF HEAT SHRINKABLE SILICONE RUBBER ON CABLES AND CABLE ASSEMBLIES,
Dow Corning Corp Midland Mich
For primary bibliographic entry see Field 9A.
AD-656 526 HC$3.00 MF$0.65

MEASUREMENT OF LINEWIDTH OF SINGLE CRYSTAL FERRITES USING A SHORTED TRANSMISSION LINE.

Army Electronics Command Fort Monmouth N J
For primary bibliographic entry see Field 20C.
AD-656 603 HC$3.00 MF$0.65

EVALUATION OF THE GYRATORY COMPACTOR FOR USE IN DESIGNING ASPHALTIC CONCRETE MIXTURES.
Louisiana Dept. of Highways. Research and Development Section.
For primary bibliographic entry see Field 11B.
PB-175 635 HC$3.00 MF$0.65

11I. Plastics

DELAYED ACTION, FOAM-IN-PLACE POLYURETHANE FOR USE IN AN AEROSPACE ENVIRONMENT.
Final rept. Feb 61-Jan 62,
Hughes Aircraft Co., Culver City, Calif.
Seymour Schwartz. Mar 63, 111p
ASD-TDR-62-416
Contract AF 33 (616)-7925

Descriptors: (*Isocyanate plastics, *Expanded plastics), Organic compounds, Chemical reactions, Solids, Water supplies, Encapsulation, Catalysts, Surface-active substances, Powders, Storage, Stability, Inflatable structures, Balloons, Thermal radiation, Foams, Space environmental conditions, Synthesis (Chemistry).

Materials and techniques were developed to meet the requirement of a delayed action, foam-in-place polyurethane for use in an aerospace environment. The methods investigated for preparation of the special polyurethane included a number of chemical blocking reactions, molecular sieves and encapsulation techniques, all designed as restraining agents to inhibit the activity of the isocyanate component.
AD-405 436 HC$3.00

THE TOXICITY OF ALKYL 2-CYANOACRYLATE TISSUE ADHESIVES: BRAIN AND BLOOD VESSELS,
Walter Reed Army Inst of Research Washington DC
For primary bibliographic entry see Field 6E.
AD-655 945 Not available from CFSTI.

ELECTRON MICROSCOPY OF POLYETHYLENE BELOW 20K,
Sussex Univ Brighton (England) School of Mathematical and Physical Sciences
For primary bibliographic entry see Field 14B.
AD-656 005 Not available from CFSTI.

ZETAFIN: COPOLYMER COMPOSITIONS FOR THE WIRE AND CABLE INDUSTRY,
Dow Chemical Co Freeport Tex Texas Div
R. F. Smith, R. C. Mildner, and E. W. Veazey. 1962, 17p
Prepared for presentation at the Annual Wire and Cable Symposium (11th) Asbury Park, N. J., 28-30 Nov 1962.

Descriptors: (*Acrylic resins, Electric cables), Crosslinking (Chemistry), Copolymerization, Polyethylene plastics, Physical properties, Electrical properties, Semiconductors, Additives, Ground (Electrical), Barrier coatings.

The Zetafin copolymers can be peroxide crosslinked either filled or natural, and, depending on the ethyl acrylate content and amount of filler, can range from stiff and boardy to very soft and rubbery compositions. Unlike polyethylene they can be produced with good physical properties even though not crosslinked and unlike E/P rubbers they do not require fillers for reinforcement. The compositions reported here were produced using ethyl acrylate copolymers of different monomer contents and ranged in melt index from 0.3 to 70. All of the compounds were filled using carbon black of two particle sizes, at three different loadings. All percentages used are based on weight of total compound. Zetafin copolymer compounds are suitable for the following semiconducting applications: Conductor and core shielding in high voltage cables; Continuous grounding of power and communications cables; Screen for non-microphonic cables; and Electrostatic screen for communications cables.
AD-656 062 HC$3.00 MF$0.65

THE EFFECTS OF SPACE ENVIRONMENTS ON INSULATION OF TEFLON (TRADE NAME) TFE AND FEP RESINS,
Du Pont de Nemours (E I) and Co Wilmington Del Plastics Dept
C. E. Jolley, and J. C. Reed. Nov 62, 21p
Prepared for presentation at Annual Signal Corps Wire and Cable Symposium (11th), Asbury Park, N. J., 28-30 Nov 62.

Descriptors: (*Electric insulation, Halocarbon plastics), (*Halocarbon plastics, Space environmental conditions), Environmental tests, Radiation damage, Physical properties, Dielectric properties.

'Teflon' TFE and FEP resins do not evaporate in a vacuum of 10 to the minus 7th power mm Hg. Theoretical calculations indicate that these resins will not evaporate in any anticipated space vacuum to an extent which would put a practical limit on their usefulness. Although some outgassing occurs initially, the volatiles are all absorbed atmospheric gases. The presence of oxygen greatly influences the physical and electrical properties of irradiated 'Teflon' TFE and FEP resins when irradiated above an approximate value of 40,000 rads. With proper design considerations, 'Teflon' TFE resins maintain their usefulness after radiation dosages of at least 10 to the 7th power rads in the absence of oxygen. 'Teflon' FEP resins, when irradiated in the absence of oxygen and above 80C show an improvement in certain desirable physical properties with doses greater than 2,600,000 rads. An upper dose limit for this material cannot be predicted because of lack of adequate data. Low frequency loss properties of 'Teflon' TFE polymers are drastically affected by x-ray irradiation. High frequency loss properties are considerably less affected. The increases in dielectric constant and dissipation factor depend upon the ambient oxygen concentration during exposure and recovery. The dielectric constant and dissipation factor of 'Teflon' FEP resins are unaffected by x-ray irradiation in vacuum for measured frequencies of 60 cps to 100 kcps. (Author)
AD-656 064 HC$3.00 MF$0.65

EXTRUDING HIGH DENSITY POLYETHYLENE FOR QUALITY AND SAVINGS,
Grace (W R) and Co Clarksville Md
For primary bibliographic entry see Field 13H.
AD-656 065 HC$3.00 MF$0.65

DIFFUSION OF GASES THROUGH POLYETHYLENE CABLE JACKETS,
Whitney Blake Co New Haven Conn
For primary bibliographic entry see Field 11C.
AD-656 076 HC$3.00 MF$0.65

SOLID POLYPROPYLENE INSULATION FOR WIRE AND CABLE APPLICATIONS,
United States Steel Corp Worcester Mass American Steel and Wire Div
Gordon P. Johnson. 29 Nov 62, 19p
Prepared for presentation at the Annual Wire and Cable Symposium, at Asbury Park, N. J.

Descriptors: (*Polyethylene plastics, *Electric insulation), Electric wire, Electric cables, Extrusion, Electrical properties, Aging (Materials).
Identifiers: Polypropylene.

Although polypropylene is not subject to environmental stress cracking, several compounds commonly used in the wire and cable industry were found that have a deleterious affect on polypropylene. For example, polypropylene will embrittle rapidly when in contact with polybutenes at elevated temperatures. Several basic applications were found where polypropylene can be used to advantage. Because of its excellent resistance to high temperature deformation and its excellent electrical properties, polypropylene was used to replace rubber insulation and thus miniaturized some constructions. The superior abrasion resistance of polypropylene over polyethylene permitted miniaturization and manufacturing in longer lengths some cables formerly insulated with polyethylene. The combination of excellent processing and abrasion resistance properties were used to replace nylon insulation with polypropylene and take advantage of the latter's superior electrical properties. The addition of stabilizers to resist copper catalyzed oxidation is a major break through. It is anticipated that with the added stabilizer polypropylene will become more widely accepted as an insulating material and that a market for polypropylene in the wire and cable industry will develop in the next few years. (Author)
AD-656 078 HC$3.00 MF$0.65

THE DESIGN AND DEVELOPMENT OF WIRE INSULATIONS FOR USE IN THE ENVIRONMENT OF OUTER SPACE.
Raychem Corp Redwood City Calif
For primary bibliographic entry see Field 9A.
AD-656 095 HC$3.00 MF$0.65

FLAME-RETARDANT VULCANIZABLE POLYETHYLENE: A NEW ENGINEERING MATERIAL,
Union Carbide Corp New York Plastics Div
G. L. Dougherty. Dec 63, 7p
Annual Wire and Cable Symposium (12th), Asbury Park, N. J., 4-6 Dec 63.

Descriptors: (*Polyethylene plastics, Fire resistant materials), Vulcanization, Extrusion, Electric wire, Electric insulation, Physical properties.

The polyethylene family of insulating materials has been given a new dimension by the advent of flame-retardant vulcanizable polyethylene. This new wire and cable engineering material combines many of the property advantages of conventional polyethylene with the more desirable properties of organic rubber. In many cases, a 'single-shot' covering of the new vulcanizable material exceeds the performance of conventional rubber insulations which require a braid or polychloroprene covering for flame or moisture resistance.
AD-656 103 HC$3.00 MF$0.65

ADHESIVE THERMOPLASTIC COPOLYMERS FOR THE WIRE AND CABLE INDUSTRY,
Dow Chemical Co Midland Mich
For primary bibliographic entry see Field 11A.
AD-656 104 HC$3.00 MF$0.65

POLYPROPYLENE CABLE WRAPS,
Hercules Powder Co Wilmington Del
For primary bibliographic entry see Field 11C.
AD-656 105 HC$3.00 MF$0.65

POLYESTER FILM LAMINATES FOR WIRE INSULATION,
Gore (W L) and Associates Inc Newark Del
W. L. Gore, and R. E. Martz. Dec 63, 9p
Prepared for presentation at the Annual Wire and Cable Symposium (12th), Asbury Park, N. J., 4 Dec 63.

Descriptors: (*Electric wire, Laminated plastics), (*Polyester plastics, Electric insulation), Films, Mechanical properties, Electrical properties.

The polyester film laminates provide new insulations for thinwall electrical and electronic wiring that are tough, resistant to many rigorous environments, good in dielectric qualities, and very high in overall reliability. These new insulations are now available in a wide variety of conductor sizes, thickness of insulation, and in cable constructions. The use-cost of this wire is low. Its use is indicated in situations where mechanical superiority is required, or wherever a low-cost, high-reliability wire is desired. (Author)
AD-656 106 HC$3.00 MF$0.65

THE CHARACTERISTICS OF KYNAR POLYVINYLIDENE FLUORIDE AS AN INSULATING MATERIAL,
Pennsalt Chemicals Corp Philadelphia Pa
A. A. Dukert, and N. T. Hall. 1966, 20p

Descriptors: (*Halocarbon plastics, *Electric insulation), Stability, Extrusion, Plastic coatings, Stresses, Manufacturing methods, Mechanical properties, Chemical properties, Thermal properties, Electrical properties, Radiation damage.

KYNAR vinylidene fluoride resin is described as crystalline high molecular weight thermoplastic, having the stability to environmental stresses inherent with the fluorocarbon combined with a high level of mechanical strength. The resin can be extruded in standard equipment to produce primary insulation and jacketing. The development of wire and cable designs using KYNAR insulation is currently in progress, and its performance to date in both military and industrial applications show it to be promising candidate for those end use areas where severe mechanical and environmental stresses exist. (Author)
AD-656 107 HC$3.00 MF$0.65

INTERMEDIATE AND LOW DENSITY LOW-PRESSURE POLYETHYLENES: THEIR PROPERTIES AND APPLICATIONS IN THE WIRE AND CABLE INDUSTRY,
Du Pont of Canada Ltd Montreal (Quebec) Plastics Dept
A. J. Houston, H. A. B. Munro, and E. T. O'Brien. Dec 63, 11p
Prepared for presentation at the Annual Symposium Technical Progress in Communication Wires and Cables (12th), Asbury Park, N. J., 4-6 Dec 63.

Descriptors: (*Polyethylene plastics, Electric insulation), (*Electric wire, *Plastic coatings), Canada, Physical properties, Performance (Engineering).

The polyethylene resins described in this paper possess a unique balance of properties. They combine the desirable features of conventional low-density polyethylene with those of high-density polyethylene, yet they suffer few of the limitations of either. Moreover, they exhibit some outstanding advantages possessed by neither conventional nor high-density resins. They provide excellent physical properties without sacrifice in ESCR or thermal embrittlement resistance. In achieving these improvements it has been necessary to cast aside traditional considerations of melt index and density, further illustrating the fact that these parameters are not true measurements of important physical properties. (Author)
AD-656 108 HC$3.00 MF$0.65

ETHYLENE PROPYLENE COPOLYMER PROVIDES A VERSATILE AND STABLE INSULATION,
Enjay Labs Linden N J
W. C. Smith, W. F. Fischer, and N. F. Newman. Dec 63, 48p Rept no. ELD-44543
Prepared for presentation at the Annual Wire and Cable Symposium (12th), Asbury Park, N. J., 4-6 Dec 63.

Descriptors: (*Polyethylene plastics, *Electric insulation), Plastic coatings, Electric wire, Performance (Engineering), Fire resistant materials, Aging (Materials), Additives, Curing agents, Physical properties, Electrical properties, Processing.

Steady field development by the wire and cable industry has led to commercial use of EPR and submission of building and appliance wires to Underwriters Labs. Established properties indicate that flexible EPR wire can be used in high and low voltage applications as insulation and jacketing. Inertness to ozone and excellent corona resistance combined with other good physical and electrical properties will permit unipass construction in some types of wires and cables. Damage tests at 300C. and heat aging at intermediate temperatures indicate EP insulation should qualify for continuous service at 90 -130C. (Class B) and be used in network cable, motor lead wire, etc. Ability to be flameproofed, fair oil resistance, flexibility at low temperatures and toughness, make EP rubber of special interest for use as a jacket. (Author)
AD-656 109 HC$3.00 MF$0.65

CELLULAR POLYPROPYLENE INSULATION,
Hercules Powder Co Wilmington Del
T. A. Coneys, and E. R. Witter. Dec 63, 21p
Prepared for presentation at the Wire and Cable Symposium (12th), Asbury Park, N. J., Dec 63.

Descriptors: (*Electric insulation, *Expanded plastics), Polyethylene plastics, Telephone lines, Dielectrics.
Identifiers: Polypropylene.

The article reviewed the advantages of cellular insulation and demonstrated how a properly designed polypropylene resin can be used to exploit these advantages in telephone cable. The extent of this advantage was outlined by comparing the relative size and material requirements for a typical telephone cable when solid LDPE and cellular Pro-fax 65A0 are employed as the primary insulation. These materials savings and diameter reductions attainable with cellular polypropylene insulation warrant the serious consideration of every cost-conscious cable manufacturer and user. (Author)
AD-656 110 HC$3.00 MF$0.65

PROPYLENE-BASED COPOLYMERS IN WIRE AND CABLE APPLICATIONS,
Avisun Corp Philadelphia Pa
N. O. Aamodt, and R. W. Gutekunst. 1963, 29p
Annual Wire and Cable Symposium, Asbury Park, N. J., December 3, 4, 5, 1963.

Descriptors: (*Polyethylene plastics, Plastic coatings), (*Electric wire, Plastic coatings), (*Electric cables, Plastic coatings), Polymers, Electric insulation, Electrical properties, Dielectrics, Wear resistance, Performance (Engineering).

The paper describes OLEMER resins, and particularly their use in a new family of electrical grade propylene-based copolymers. These copolymers have sufficiently good low temperature properties to allow their use in a large number of wire and cable applications. These good low temperature properties have been obtained without sacrificing the desirable properties of polypropylene. Pertinent characteristics of the copolymers are compared with those for polypropylene and linear polyethylene. This analysis suggests several wire and cable applications which can use these copolymers to advantage. (Author)
AD-656 111 HC$3.00 MF$0.65

EVALUATING CHEMICALLY CROSSLINKED POLYETHYLENES,
General Electric Co Bridgeport Conn Wire and Cable Dept
S. C. Martens. Dec 63, 27p
Annual Wire and Cable Symposium (12th) Technical Progress in Communication Wires and Cables, Asbury Park, N. J., 4-6 Dec 63.

Descriptors: (*Polyethylene plastics, Crosslinking (Chemistry)), Filling, Dielectric properties, Electric cables, Electric wire, Tensile properties, Creep, Deformation, Plastic coatings, Additives.

A brief history of peroxide crosslinking of polyethylene is given. Some relations of compounding ingredients and formulations for satisfactory product performance are described and the need for compounding for the best overall balance of properties is stressed. A list of Vulkene wire and cable products is indicated with advantages of these products over other wire and cable insulation types. In addition to developing the optimum compound for the product, the importance of proper processing and particularly the importance of cure on product performance is emphasized. Finally, a quick, accurate hot modulus test for determining the degree of crosslinking is recommended as being particularly suited to the various wire sizes and wall thicknesses encountered in the wire and cable industry. (Author)
AD-656 116 HC$3.00 MF$0.65

CHEMICALLY CROSS-LINKED POLYETHYLENE. A GENERAL-PURPOSE COMPOUND,
Anaconda Wire and Cable Co Marion Ind
C. J. Oatess, and T. H. Ling. 1959, 18p

Descriptors: (*Polyethylene plastics, Crosslinking (Chemistry)), (*Electric cables, *Plastic coatings), Electrical properties, Physical properties, Aging (Materials), Toughness, Electric insulation.

A general-purpose, chemically cross-linked polyethylene was developed which possesses an excellent balance of properties indicating its suitability for a wide variety of cable applications. The object of this paper is to discuss the properties and cable applications of the general-purpose compound under 2 KV. (Author)
AD-656 163 HC$3.00 MF$0.65

A NEW APPROACH TO COMPOUNDING FOR HIGH TEMPERATURE VINYL WIRE INSULATION,
Thompson Chemical Co Pawtucket R I
Joseph Fath, and Sam G. Grillo. 1961, 22p

Descriptors: (*Vinyl plastics, Electric insulation), (*Plasticizers, *Polyvinyl chloride), Aging (Materials), Electrical properties, Electric wire, Physical properties, Degradation.

The data presented here shows TRUFLEX 300 to be a versatile and effective new plasticizer for 80C, 90C and 105C wire formulations. Functional compounds using 300 as the sole plasticizer or in combination with others can be prepared. It is believed that this plasticizer represents a novel contribution to the wire and cable industry. (Author)
AD-656 164 HC$3.00 MF$0.65

CELLULAR INSULATION FOR COMMUNICATIONS CABLE,
Union Carbide Corp New York Plastics Div
B. B. Pusey. 1961, 11p
Prepared for presentation at the Annual Signal Corps Symposium on Communications Wire and Cable Asbury Park, N. J., November 29-December 1, 1961.

Descriptors: (*Expanded plastics, *Electric insulation), (*Electric insulation, Electric cables), Polyethylene plastics, Vinyl plastics, Telephone lines, Economics, Extrusion, Tensile properties, Dielectric properties, Physical properties.

The paper describes development in cellular insulation for communications cable by comparing the

properties of BAKELITE DGDA-2580 with those of several other cellular products and with solid polyethylene presently used for telephone cable singles. Also presented are representative figures illustrating the economies of cellular insulation and a review of extrusion conditions for cellular insulation.
AD-656 169 HC$3.00 MF$0.65

THE INFLUENCE OF EXTRUDER GEOMETRY IN THE PRODUCTION OF HOMOGENEOUS CELLULAR PLASTIC INSULATION,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 13H.
AD-656 170 HC$3.00 MF$0.65

ELECTRICAL FATIGUE AND DIELECTRIC STRENGTH IN TEFLON TFE INSULATION,
Brand-Rex Div Willimantic Conn
D. E. Foster, R. T. Guthrie, and H. E. Pendergast. 1961, 2p
Annual Wire and Cable Symposium (10th), Asbury Park, N. J., November 29-Dec 1, 1961.

Descriptors: (*Halocarbon plastics, *Electrical properties), (*Electric insulation, Halocarbon plastics), Defects (Materials), Failure (Electronics), Dielectric properties, Electric discharges, Test methods.

All high-voltage failures of Teflon insulation are initiated in and propagated from defects in the insulation. Teflon insulation containing no gross voids or foreign particles is capable of withstanding continuous testing for many hours under the conditions specified by MIL-C-915. Intermittent application of the voltage lengthens the time to failure, indicating partial reversibility of the damage caused by over-voltage testing. Time to failure decreases sharply as the voltage is increased beyond that specified. Pigmentation generally decreases dielectric strength. Other defects may mask the effect of pigment. Major defects are usually detected by the AC overvoltage test, but a fault which is not quite large enough to fail during the test will become a more likely site for failure in service, because of the propagation of breakdown channels during the brief overvoltage test. A subsequent test may find such a fault, but will in turn enlarge still smaller faults, making them the sites of possible in-service breakdown. If the breakdown channel length is a large fraction of the thickness of the insulation, measurable ionic discharges will occur at the rated voltage. The rate of erosion by these low-energy discharges will be low, probably negligible, and failure will probably occur during a switching surge, rather than during steady-state operation. The number of internal discharges which will cause failure of TFE insulation at a fault of given magnitude is reached more rapidly as the frequency is increased.
AD-656 171 HC$3.00 MF$0.65

SILICONE RUBBER GRADED CONSTRUCTION FOR HIGH VOLTAGE INSULATION,
Dow Corning Corp Midland Mich
For primary bibliographic entry see Field 9A.
AD-656 174 HC$3.00 MF$0.65

NEW FLUOROCARBON INSULATION COMPOUNDS,
Gore (W L) and Associates Inc Newark Del
W. L. Gore. 2 Dec 60, 6p
Prepared for presentation at the Annual Wire and Cable Symposium (9th), Asbury Park, N. J., 2 Dec 60.

Descriptors: (*Halocarbon plastics, *Electric insulation), Wear resistance, Electrical corona, Failure (Electronics), Creep, Electric wire, Electric cables.

A report is made of new abrasion resistant and corona resistant teflon compounds.
AD-656 187 HC$3.00 MF$0.65

PRODUCTION BY AUTOGENOUS EXTRUSION,
Western Electric Co Inc Baltimore Md
For primary bibliographic entry see Field 13H.
AD-656 188 HC$3.00 MF$0.65

A TECHNICAL PAPER ON THE IRRADIATION INDUCED ELASTIC MEMORY OF POLYMERS.
Technical rept.,
Raychem Corp Redwood City Calif
Vincent L. Lanza, and Paul M. Cook. 1960, 11p
Annual Wire and Cable Symposium (9th), Asbury Park, N. J., 30 Nov, 1-2 Dec 1960.

Descriptors: (*Polymers, Radiation damage), (*Polyethylene plastics, *Radiation damage), Crosslinking (Chemistry), Elasticity, Physical properties, Material forming.

One of the most interesting and novel applications has resulted from a study of the irradiation induced elastic memory of polymers. A typical example is the work that has been done with polyethylene. A most interesting feature of irradiated (crosslinked) polyethylene is that it behaves as a semicrystalline polymer below its crystalline melting point, and as a rubber above its crystalline melting point, due to the irradiation induced three-dimensional gel network. It is possible to irradiate (crosslink) polyethylene in the solid state to form a three-dimensional gel network and then deform (i.e. expand or contract) polyethylene parts in the molten state. The deformation is accomplished because of the rubber-like extensibility and strength of the polymer when molten. It is then possible to freeze the particular part in the deformed state resulting in a stable configuration due to recrystallization of the polymer. This stable configuration will persist until the polymer is reheated to a temperature above its crystalline melting point, whereupon the polyethylene part will return to its original predetermined dimension. The unique combination of plastic-rubber-like properties permits one to use irradiated polyethylene in many and varied forms where crystalline melting through heat causes the polymer part to return precisely to its original cross-linked geometry. (Author)
AD-656 190 HC$3.00 MF$0.65

NEW LOW-LOSS 'BALLOON' TYPE POLYETHYLENE INSULATION FOR TELECOMMUNICATION CABLES,
Societe Anonyme de Telecommunications Paris (France)
For primary bibliographic entry see Field 11G.
AD-656 195 HC$3.00 MF$0.65

HEAT AGING STUDIES OF CHEMICALLY CROSS-LINKED POLYETHYLENE,
Union Carbide Corp New York Plastics Div
A. E. Tarbox. 1960, 30p
Prepared for presentation at the Signal Corps Wire and Cable Symposium, Asbury Park, N. J., November 30-December 3, 1960.

Descriptors: (*Polyethylene plastics, Aging (Materials)), Crosslinking (Chemistry), Antioxidants, Additives, Electric insulation, Temperature, Tensile properties, Compressive properties, Mechanical properties, Degradation.

Chemically cross-linked polyethylene without sufficient antioxidant degrades on heat aging, losing its tensile properties, compression cut-through resistance, flexibility at low temperatures, appearance and electrical properties. This material can be protected, however, with antioxidants to retain sufficient physical and electrical properties to become serviceable over a wide range of temperatures up to 136 deg. C. At least .5 of antioxidant per 100 parts of resin is considered necessary to accomplish this protection against heat aging. Additional testing must be conducted to determine the upper limits of antioxidant addition in order to predict longer continuous service use at elevated temperatures. The future for chemically crosslinked polyethylene is encouraging and the characteristics of this material are such that it should find use as electrical insulation in many areas where wires and cables are subject to abnormal temperatures. (Author)
AD-656 196 HC$3.00 MF$0.65

HIGH DENSITY POLYETHYLENE INSULATION IN COMMUNICATION CABLES,
Plastic Wire and Cable Corp Jewett City Conn
For primary bibliographic entry see Field 9A.
AD-656 197 HC$3.00 MF$0.65

DEGRADATION OF POLYMERS BY EXTERNAL CORONA DISCHARGE,
Anaconda Wire and Cable Co Hastings-on-Hudson N Y
For primary bibliographic entry see Field 11J.
AD-656 198 HC$3.00 MF$0.65

SILICONE COMPOUND DEVELOPMENT AND QUALITY CONTROL THROUGH USE OF THE MOONEY VISCOMETER,
General Electric Co Waterford N Y Silicone Products Dept
Richard M. Savage. Nov 60, 6p
Prepared for presentation at the Annual Wire and Cable Symposium (9th), Asbury Park, N. J., 30 Nov-2 Dec 60.

Descriptors: (*Silicone plastics, Quality control), (*Quality control, *Viscosimeters), Viscosity, Aging (Materials).

A proper knowledge of the viscosity and curing characteristics of silicone rubber is essential to all who must work with such materials. Well adapted measuring equipment and techniques are available, and a brief insight into the chemical reactions behind these data is given. Three application areas of interest to the product development man or compounder, as well as to the fabricator, are illustrated. Examples of application to Quality Control have also been given.
AD-656 199 HC$3.00 MF$0.65

AN ADAPTER TO IMPROVE THE SENSITIVITY OF THE Q METER FOR DIELECTRIC LOSS MEASUREMENTS OF POLYETHYLENE,
Union Carbide Corp New York Plastics Div
For primary bibliographic entry see Field 14B.
AD-656 201 HC$3.00 MF$0.65

AN IMPROVED OVEN FOR ACCELERATED AGING OF POLYVINYL CHLORIDE COMPOUNDS,
Monsanto Chemical Co Springfield Mass
For primary bibliographic entry see Field 13A.
AD-656 202 HC$3.00 MF$0.65

WIRE JACKETS OF NYLON R = K (PQ) + (EC) TO THE X POWER,
Du Pont de Nemours (E I) and Co Wilmington Del Polychemicals Dept
For primary bibliographic entry see Field 11C.
AD-656 203 HC$3.00 MF$0.65

POLYMER REQUIREMENTS AND INSULATING TECHNIQUES FOR OBTAINING THE MAXIMUM BENEFITS OF HIGH DENSITY POLYETHYLENE,
Goodrich-Gulf Chemicals Inc Cleveland Ohio
R. J. Ettinger. 1960, 12p

Descriptors: (*Polyethylene plastics, Extrusion), (*Electric insulation, Polyethylene plastics), Processing, Physical properties, Stresses, Cracks,

Dies, Brittleness, Resistance (Electrical), Tensile properties, Shock resistance.

Quality wire extrusions can now be made from high density polyethylene. Only the very high molecular weight polymers should be used for this purpose. If these data are compared with published data on other electrical grade plastics, it appears that high density polyethylene insulations have stress cracking and thermal lives which are much superior to other electrical grade plastics. These life properties, while outstanding in themselves, can be further improved by the use of a suitable antioxidant and/or channel black. By following the techniques outlined in this paper, it is possible to reduce the processing problems often encountered with these polymers. (Author)
AD-656 216 Not available from CFSTI.

AN EVALUATION OF HEAT STABILIZED, FLAME-RETARDED, CROSS-LINKED POLYOLEFINS FOR ELECTRONIC WIRE AND CABLE APPLICATIONS.
Technical rept.,
Raychem Corp Redwood City Calif
Paul M. Cook, Richard W. Muchmore, and Howard Rapp. 1959, 18p
Prepared for presentation at the Annual Symposium Communication Wire and Cable (8th), Asbury Park, N. J., December 1, 2 and 3, 1959.

Descriptors: (*Polyethylene plastics, Electric insulation), (*Electric wire, Polyethylene plastics), Crosslinking (Chemistry), Fire resistant materials, Corrosion resistance, Molecular structure, Deformation, Performance (Engineering).

A new electronic hookup wire was developed for service over a wide temperature range based upon a heat stabilized flame retarded cross-linked polyolefin insulation. Cross-linking is accomplished by exposure of the wire to massive doses of high energy electron radiation. Previous limitations of low softening temperature, poor corrosion characteristics with conventional flame retardants, poor oxidation resistance, and lack of toughness and abrasion resistance that retarded the use of polyethylene as thin wall hookup wire insulation have been eliminated. A strong elastomeric three dimensional network give substantial strength at elevated temperatures along with a remarkable oxidation resistance giving extended high temperature service even while under severe stress. A new flame retarded system has eliminated any corrosion problems. The deformation of the insulation by a small radius under high unit stress is remarkable good and indicative of the ability to withstand rugged handling and assembly practices. Additional advantages of this new hookup wire include outstanding radiation resistance, chemical resistance and abrasive resistance. The wire is a light weight, relatively low cost product for service in difficult environmental situations. (Author)
AD-656 226 HC$3.00 MF$0.65

NYLON 6 AS A WIRE JACKETING MATERIAL,
Spencer Chemical Co Henderson Ky Nylon Technical Dept
For primary bibliographic entry see Field 11C.
AD-656 228 HC$3.00 MF$0.65

FILLER STUDY IN CROSS-LINKED POLYETHYLENE,
Vanderbilt (R T) Co Inc East Norwalk Conn Rubber Div
W. F. Abbey, B. C. Carlson, and R. T. Zimmerman. Dec 59, 13p
Annual Symposium on Communication Wire and Cable (8th), Asbury Park, N. J., 1-3 Dec 59.

Descriptors: (*Polyethylene plastics, *Additives), Crosslinking (Chemistry), Carbon black, Calcium compounds, Carbonates, Peroxides, Aging (Materials), Dielectric properties, Resistance (Electrical).

Some of the physical and electrical properties of cross-linked polyethylene loaded with THERMAX, a medium thermal carbon black, and Atomite, a ground calcium carbonate, were evaluated. These properties were related to the degree of cross-linking obtained by change in peroxide content and time of cure. These properties, original and after hot air aging, have also been compared with filler loadings at three levels. (Author)
AD-656 233 HC$3.00 MF$0.65

NEW INSULATION APPLICATIONS OF HIGH-DENSITY POLYETHYLENE AND POLYPROPYLENE,
Hercules Powder Co Wilmington Del
W. Paul Acton, and Lawrence C. Petzold. Dec 59, 9p
Prepared for presentation at the Annual Wire and Cable Symposium (8th), Asbury Park, N. J., 1-3 Dec 59.

Descriptors: (*Polyethylene plastics, Electric insulation), Density, Electrical properties, Thermal properties, Mechanical properties, Plastic coatings, Extrusion, Electric wire, Electric cables.
Identifiers: Polypropylene.

The article discusses the use of high-density polyethylene and polypropylene as insulation material for communication wires and cables.
AD-656 234 HC$3.00 MF$0.65

ETHYLENE COPOLYMERS FOR WIRE COATING,
Phillips Chemical Co Bartlesville Okla Plastics Sales Div
R. F. Craig, T. E. Branscum, and P. J. Boeke. 1958, 16p

Descriptors: (*Plastic coatings, *Polyethylene plastics), Electric wire, Physical properties, Electrical properties, Electric cables.

The paper reviews the pertinent physical and electrical properties of the copolymer resin, discusses extrusion equipment and conditions and presents field installation tests of various copolymer coated wire and cable. (Author)
AD-656 235 HC$3.00 MF$0.65

THE DEPENDENCE OF PHOTOLYTIC DEGRADATION OF POLYETHYLENE ON DEGREE OF DISPERSION OF CARBON BLACK,
Bell Telephone Labs Inc Murray Hill N J
V. L. Lanza, J. H. Heiss, and W. M. Martin. 1958, 16p

Descriptors: (*Polyethylene plastics, Degradation), (*Photolysis, Polyethylene plastics), Carbon black, Additives, Scattering, Aging (Materials), Brittleness, Dielectric properties.

The resistance to weathering of these polyethylene-carbon black formulations can be predicted from the Ambrose modification of the Angstrom approximation. The higher negative optical density-wavelength slopes indicate the more weather resistant compounds. The photo-induced degradation in black formulations is mainly a surface phenomenon which greatly affects the low temperature brittle properties. The dielectric loss, enhanced by the production of polar groups during degradation, depends upon bulk properties and does not reflect the changes in physical properties, especially during the early stages of degradation. Experimental data show, for unweathered compounds, a direct relationship between dielectric loss and the degree of dispersion of a single carbon black in polyethylene. When the carbon black particles approach ultimate dispersion, as evidenced by high negative values for optical slope, the dielectric loss tends toward a minimum value. (Author)
AD-656 236 HC$3.00 MF$0.65

THE PROBLEM OF DRYING POLYETHYLENE SHEATHING COMPOUND PRIOR TO EXTRUSION,
Western Electric Co Inc Chicago Ill
For primary bibliographic entry see Field 13H.
AD-656 240 HC$3.00 MF$0.65

COLOR STANDARDS FOR PLASTIC INSULATED COMMUNICATION CABLES AND WIRES,
Rural Electrification Administration Washington D C
For primary bibliographic entry see Field 17B.
AD-656 246 HC$3.00 MF$0.65

DITRIDECYL PHTHALATE (DTDP) IN HIGH TEMPERATURE VINYL INSULATION,
Enjay Labs Linden N J
For primary bibliographic entry see Field 7C.
AD-656 247 HC$3.00 MF$0.65

BUTYL INSULATION,
Esso Research and Engineering Co Linden N J
W. C. Smith. 1954, 60p
Annual Wire and Cable Symposium (3rd), Asbury Park, N. J., December 7, 8, 9, 1954.

Descriptors: (*Butyl rubber, *Electric insulation), Processing, Extrusion, Corrosion resistance, Ozone, Aging (Materials), Electrical properties, Stability, Dielectric properties, Rubber coatings.

The paper presents information on butyl rubber for the wire and cable industry, and provides facts and observations which will serve as a base for development of sound compounds for the industry's varied interests. The information is grouped under properties desired in insulation: processing to give smooth non-swollen extrusions, ozone resistance and ways to obtain the optimum in resistance to cracking, heat aging, electrical properties and their stability in water, dielectric strength, a comparison of sulfur with quinoid cures, and a section on jacketing. (Author)
AD-656 253 HC$3.00 MF$0.65

THE EFFECTS OF SOIL MICROORGANISMS ON THE PHYSICAL AND ELECTRICAL CHARACTERISTICS OF RADIO FREQUENCY CABLES,
Signal Corps Engineering Labs Fort Monmouth N J
Alex Rogel. 1954, 18p
Annual Wire and Cable Symposium, Asbury Park, N. J., December 7-9, 1954.

Descriptors: (*Electric insulation, *Fungus deterioration), (*Plastics, Fungus deterioration), Polyethylene plastics, Vinyl plastics, Nylon, Plasticizers, Degradation, Radiofrequency cables, Physical properties, Electrical properties.

Since the presence or absence of visual fungus growth is not a reliable means for predicting whether the cable insulation has undergone a change in electrical properties, a study was made of such effects by making measurements of insulation resistance before and after soil burial exposures. The vinyl cables showed a decrease in insulation resistance at the end of a 30 month exposure period, which is regarded as insignificant.
AD-656 255 HC$3.00 MF$0.65

ENGINEERING POLYETHYLENE FOR WIRE AND CABLE,
Du Pont de Nemours (E I) and Co Wilmington Del Polychemicals Dept
E. J. Burrough, and E. E. Lewis. 1954, 11p
Annual Wire and Cable Symposium, Asbury Park, N. J., December 7, 8, and 9, 1954.

Descriptors: (*Electric insulation, Polyethylene plastics), (*Polyethylene plastics, Preparation),

Synthesis (Chemistry), Polymerization, Molecular structure, Molecular weight, Mechanical properties, Electrical properties.

A review is given of the progress of efforts to modify the polyethylene molecule and to prepare new polyethylene-based compounds in order to improve the utility of this class of materials as wire coverings.
AD-656 260 HC$3.00 MF$0.65

IRRATHENE 201 IRRADIATED POLYETHYLENE: A NEW CABLE INSULATION,
General Electric Co Pittsfield Mass
P. A. Goodwin. 1966, 6p

Descriptors: (*Electric insulation, Polyethylene plastics), Electron bombardment, Physical properties, Electrical properties, Encapsulation, Tapes, Electric cables.

Irrathene 201 irradiated polyethylene offers all of the advantages of conventional polyethylene: (1) Low loss characteristics at all frequencies. (2) High dielectric strength. (3) Excellent barrier to moisture. (4) Chemical inertness. (5) Low specific gravity. (6) Good mechanical properties. In addition, it may be used at higher temperatures than conventional polyethylene and is highly resistant to environmental stress cracking. It offers the possibility of encapsulation of conductors or various electrical devices to provide a homogeneous, water-tight case of excellent properties. It should be considered for use wherever layer insulation such as varnished cloth, oil-impregnated paper or plastic films are now used or in new applications wherever the encapsulation technique is of interest. (Author)
AD-656 261 HC$3.00 MF$0.65

THE EFFECTS OF CONDUCTOR TEMPERATURE ON THE QUALITY OF EXTRUDED VINYL WIRE INSULATION,
Bakelite Co Bound Brook N J
For primary bibliographic entry see Field 13H.
AD-656 266 HC$3.00 MF$0.65

THE AGEING OF POLYTHENE COMPOSITIONS,
Imperial Chemical Industries Ltd Wellwyn Garden City (England) Plastics Div
N. D. MacLeod. Dec 54, 17p
Annual Wire and Cable Symposium (3rd), Asbury Park, N. J., 8 Dec 54.

Descriptors: (*Polyethylene plastics, Aging (Materials)), Life expectancy, Oxidation, Antioxidants.

The paper describes work on the atmospheric ageing of polythene and polythene compositions at elevated temperatures in the solid state, and includes results of weathering trials of polythene compositions exposed in India for the past five years. (Author)
AD-656 267 HC$3.00 MF$0.65

QUALITY CONTROL OF VINYL AND POLYETHYLENE ELECTRICAL INSULATING AND JACKETING MATERIALS,
Bakelite Co Bound Brook N J
R. C. Boyd. Dec 54, 14p
Annual Wire and Cable Symposium (3rd), Asbury Park, N. J., Dec 54.

Descriptors: (*Electric insulation, Quality control), (*Vinyl plastics, Electric insulation), (*Polyethylene plastics, Electric insulation), Manufacturing methods, Extrusion, Standards, Dielectric properties, Mechanical properties.

A quality control system consists of routine surveillance of three items: raw materials, process, and finished product. It is essential that good testing methods be available which apply to each of these three items as required and which are meaningful in terms of finished product application. This report describes the systems used with such methods for one vinyl and one polyethylene material.
AD-656 268 HC$3.00 MF$0.65

KEL-F (TRADE NAME) ELASTOMER: A NEW MATERIAL FOR THE ELECTRICAL INDUSTRY,
Kellogg (M W) Co Jersey City N J
M. E. Conroy, and L. E. Robb. Dec 54, 27p
Annual Wire and Cable Symposium (3rd), Fort Monmouth, N. J., 8 Dec 54.

Descriptors: (*Halocarbon plastics, Performance (Engineering)), Electric insulation, Elastomers, Physical properties, Chemical properties, Electrical properties, Vulcanizates, Stability, Peroxides, Aging (Materials), Low-temperature research, Additives.

The paper summarizes the compounding and significant properties of KEL-F Elastomer as related to its potential application in the electrical industry. As a raw material it comes equipped with many excellent properties required of electrical insulation. These include: high tensile strength, extensibility, tear strength, abrasion resistance, thermal stability, extremely low water absorption, and resistance to oxidants, and a variety of chemicals. It is hoped that these characteristics will assist the electrical industry in the design of specialized insulation to be used in those applications where a high strength rubber must withstand heat and corrosive chemicals. Such applications immediately foreseen are insulated wire and cable, sheath stock, tapes, potting compounds, and electrical connectors, grommets, and seals.
AD-656 269 HC$3.00 MF$0.65

THE APPLICATION OF SILICONE RUBBER INSULATED WIRES AND CABLES,
General Electric Co Bridgeport Conn Wire and Cable Dept
For primary bibliographic entry see Field 9A.
AD-656 270 HC$3.00 MF$0.65

AN EVALUATION OF VINYL HOOK-UP WIRES,
Brand-Rex Div Willimantic Conn
For primary bibliographic entry see Field 9A.
AD-656 273 HC$3.00 MF$0.65

MICRODENSITOMETRIC DETERMINATION OF DISPERSION,
Union Carbide Corp New York Plastics Div
For primary bibliographic entry see Field 14B.
AD-656 275 Not available from CFSTI.

NEW EXTRUSION TECHNIQUES WITH SILICONE RUBBER,
Union Carbide Corp New York Silicones Div
For primary bibliographic entry see Field 13H.
AD-656 279 HC$3.00 MF$0.65

MEASUREMENT OF THE DEGREE OF DISPERSION OF CARBON BLACK IN POLYETHYLENE USING ABSORPTION OF LIGHT,
Battelle Memorial Inst Columbus Ohio
George G. Cocks, and Alfred P. Metzger. 1958, 28p
Prepared for presentation at the Annual Symposium on Technical Progress in Communication Wires and Cables, Asbury Park, N. J., December 1958.

Descriptors: (*Carbon black, Scattering), (*Polyethylene plastics, Carbon black), Measurement, Absorption, Light transmission, Films, Test methods.

Results indicate that the light transmission through a film of black polyethylene is affected by several variables in addition to dispersion. These include: (1) the particle size of the carbon black, (2) the thickness of the film, and (3) the area under examination. The wavelength of light also appears to have some influence on the light absorptivity of polyethylene. The experimental results indicate that the area under examination, i.e., the cross-sectional area of the light beam, has a strong influence on light-transmission values. Variations in transmission are averaged to a greater degree when the area is relatively large. It appears that this averaging of transmission data tends to obscure the desired measurement. The 'dispersion' of carbon black should be a measure of the variation in concentration of the carbon black, on a minute scale, within the polyethylene film. Measurements of light transmission have been made on areas of film of the order of 2 microns in diameter, and it appears that the variations in transmission on this scale are more indicative of the weathering properties than measurements on a larger area. Absorptivity measurements on a number of carbon black-pigmented samples, using both the method prescribed by Federal Specification L-P-590 and the microspectrophotometer technique developed in this work, indicate rather conclusively that the proposed specification will not provide the degree of product control that was intended.
AD-656 280 HC$3.00 MF$0.65

POLYTHENE-MECHANISM OF FRACTURE,
Imperial Chemical Industries Ltd Wellwyn Garden City (England) Plastics Div
P. L. Clegg, S. Turner, and P. I. Vincent. 1958, 17p
Annual Wire and Cable Symposium (7th), Asbury Park, N. J., December 2-4, 1958.

Descriptors: (*Polyethylene plastics, Fracture (Mechanics)), Failure (Mechanics), Stresses, Films, Brittleness, Tensile properties, Impact tests.

Topics included are: Tensile failure; Impact failure; Low temperature failure; Film failure; Long time failure.
AD-656 281 HC$3.00 MF$0.65

THERMAL STRESS-CRACKING OF POLYETHYLENE II,
Bell Telephone Labs Inc Murray Hill N J
J. H. Heiss, V. L. Lanza, and W. M. Martin. 1959, 13p

Descriptors: (*Polyethylene plastics, Fracture (Mechanics)), Thermal stresses, Cracks, Failure (Mechanics), Strain (Mechanics).

Under comparatively low strains (up to 50 per cent), the high density (0.96 g/ml) polyethylene thermally stress-cracked in essentially uniaxial tension in the same manner as in the helical-wrap test. This is not at variance with the earlier proposed hypothesis involving elastic distortion of spherulites. In both tests the limiting value of strain, as well as the time to failure at various strain levels, was about the same. Further, from approximately 10 per cent strain to 50 per cent strain, there was no significant change in the time to failure. Observations have shown that thermal stress-cracking and heat embrittlement, which is presumably due to gross changes in crystalline texture, are different phenomena. Further testing has substantiated the fact that high density polyethylenes are quite susceptible to thermal stress-cracking, while low density polyethylenes do not appear to be affected. It also appears that thermal stress-cracking can occur in molded parts containing 'frozen-in' strains. (Author)
AD-656 282 HC$3.00 MF$0.65

EFFECTS OF PLASTICIZERS UPON DRY BLENDING POLYVINYL CHLORIDE RESINS,

Firestone Plastics Co Pottstown Pa
Russell A. Park. Dec 58, 30p
Annual Wire and Cable Symposium (7th), at Asbury Park, N. J., 3 Dec 58.

Descriptors: (*Polyvinyl chloride, Plasticizers), Mixtures, Adsorption, Compatibility, Physical properties.

The paper deals with effects of plasticizers in the concentrations most often encountered in the calendering, dry blend extrusion, and injection molding fields; that is, 20% to 50% by weight of plasticizer. (Author)
AD-656 286 HC$3.00 MF$0.65

CARBON-BLACK-LOADED CROSS-LINKED POLYETHYLENE,
Cabot (Godfrey L.) Inc Boston Mass
Allen C. Bluestein, and B. B. S. T. Boonstra. 1958, 30p
Prepared in cooperation with Anaconda Wire and Cable Co. Prepared for presentation at the Wire and Cable Symposium (7th), Asbury Park, N. J., 3 Dec 58.

Descriptors: (*Polyethylene plastics, Crosslinking (Chemistry)), Carbon black, Additives, Filling, Electrical properties, Mechanical properties, Creep.

The properties of a class of material prepared from low-density polyethylene by compounding with carbon black and a chemical cross-linking agent and subsequent cross-linking are discussed. It is stressed that a wide range of electrical and mechanical properties may be obtained by suitable compounding varying the loading and the type of black. These properties may vary from a semiconducting material to a low loss insulator. All cured compounds are free from stress cracking and exhibit a minimum of plastic flow at elevated temperatures. (Author)
AD-656 288 HC$3.00 MF$0.65

DEVELOPMENT AND APPLICATION NOTES ON 'THIN-WALL' TEFLON INSULATED WIRE AND CABLE,
Inso Electronic Products Inc Nutley N J
For primary bibliographic entry see Field 9A.
AD-656 292 HC$3.00 MF$0.65

FLAME RETARDANT POLYETHYLENE FOR WIRE AND CABLE,
Rome Cable Corp N Y
R. C. Graham, and C. A. Neros. Dec 58, 14p
Prepared in cooperation with Diamond Alkali Co., Painesville, Ohio. Prepared for presentation at the Annual Wire and Cable Symposium (7th), at Asbury Park, N. J., 2 Dec 58.

Descriptors: (*Polyethylene plastics, Fire resistant materials), Electric wire, Electric cables, Plastic coatings, Flammability, Butyl rubber, Additives, Tensile properties, Density, Electrical properties, Electric insulation.

Loadings on polyethylene up to 36 percent with proper ratios of chlorinated paraffin to antimony trioxide produce wire coating compounds meeting the desired levels of flame retardancy as described herein. The use of high molecular weight polyethylene improves physical characteristics of the resultant mixture. The addition of small quantities of butyl rubber to the extent of about 5.0% on the polyethylene, further improves properties so that the final compound more closely exhibits the original performance characteristics of the polyethylene resin. These compositions have been found to produce satisfactory insulation and jacket compounds. (Author)
AD-656 293 HC$3.00 MF$0.65

EVEN COUNT POLYETHYLENE INSULATED CABLE,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 9A.
AD-656 294 HC$3.00 MF$0.65

STATUS OF POLYMONOTRIFLUOROCHLOROETHYLENE INSULATED WIRE,
Brand-Rex Div Willimantic Conn
For primary bibliographic entry see Field 9A.
AD-656 319 HC$3.00 MF$0.65

PROPERTIES OF PLASTICIZERS AND THEIR RELATION TO ELECTRICAL COMPOUNDING,
Bakelite Co New York
J. J. Morris, and W. J. Canavan. 1953, 13p
Wire and Cable Symposium at Asbury Park, N. J., on December 15, 1953.

Descriptors: (*Plasticizers, Polyvinyl chloride), Electric insulation, Aging (Materials), Resistance (Electrical), Clay, Vaporization, Reaction kinetics.

The important properties of plasticizers used in the electrical insulating industry are reviewed. The main emphasis was placed on properties which could be most easily used to determine the actual or potential usefulness of existing commercial plasticizers and which serve as guide posts in the search for new plasticizers. The following subjects were considered: (1) Plasticizer volatility and aging characteristics, (2) Plasticizer effects on resistivity, (3) Plasticizer influence on dry blending rate, (4) Effects of clay on plasticizer properties.
AD-656 323 HC$3.00 MF$0.65

BAKELITE CELLULAR POLYETHYLENE,
Bakelite Co Bound Brook N J
W. T. Higgins. 1953, 15p
Annual Wire and Cable Symposium at Asbury Park, New Jersey, on December 15, 1953.

Descriptors: (*Polyethylene plastics, Expanded plastics), Electric insulation, Extrusion, Plastic coatings, Tensile properties, Dielectric properties, Density, Absorption (Physical), Water, Radiofrequency power.

Because cellular polyethylene is 50% gas, it can easily be predicted that certain properties of the polyethylene will be degraded while others will be improved. The tensile strength, elongation and dielectric strength of the cellular composition are degraded when compared with solid polyethylene but are still in a range which permits the use of this compound in many applications. The power factor values are essentially the same. The dielectric constant is very much lower and hence the cellular material exhibits lower losses than the solid polyethylene. The very low density is desirable where reduced cost and weight are important.
AD-656 324 HC$3.00 MF$0.65

A NEW MATERIAL FOR SPLICING WIRE AND CABLE,
Minnesota Mining and Mfg Co St Paul
For primary bibliographic entry see Field 9A.
AD-656 326 HC$3.00 MF$0.65

COMPOUNDING OF G.E. ELECTRICAL GRADE SILICONE RUBBER.
General Electric Co Schenectady N Y
1967, 16p

Descriptors: (*Silicone plastics, *Electric insulation), (*Additives, Silicone plastics), Electrical properties, Dielectric properties, Hardness, Tensile properties, Absorption (Physical), Aging (Materials), Chemical compounds.

Fillers for an electrical grade silicone rubber are evaluated with regard to electrical properties, dielectric constant, and % power factor. Stability in water soaks are correlated with the water absorption of the compound, as measured by mechanical pick up, and the importance of low water absorption fillers stressed. (Author)
AD-656 328 HC$3.00 MF$0.65

SILICONE RUBBER AS CABLE INSULATION,
Dow Corning Corp Midland Mich
For primary bibliographic entry see Field 9A.
AD-656 331 HC$3.00 MF$0.65

MEASUREMENT OF VOLUME RESISTIVITY OF PLASTICIZED POLYVINYL CHLORIDE,
Rohm and Haas Co Philadelphia Pa
C. E. Balmer, and R. F. Conyne. 1955, 14p

Descriptors: (*Polyvinyl chloride, Resistance (Electrical)), Measurement, Plasticizers, Test methods.

A test procedure is described for the determination of volume resistivity of molded slabs of plasticized PVC which is relatively simple, requires a small amount of test compound, and gives good reproducibility of results. In addition, these volume resistivity results show good correlation with insulation resistance results obtained on samples of insulated wire. (Author)
AD-656 371 HC$3.00 MF$0.65

PROTECTION PROBLEMS ON TELEPHONE DISTRIBUTION SYSTEMS,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 17B.
AD-656 373 HC$3.00 MF$0.65

POLYETHYLENE-INSULATED TELEPHONE CABLE,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 17B.
AD-656 374 HC$3.00 MF$0.65

MILITARY APPLICATIONS OF SILICONE RUBBER INSULATED WIRE AND CABLE,
Dow Corning Corp Midland Mich
For primary bibliographic entry see Field 9A.
AD-656 378 HC$3.00 MF$0.65

PHYSICAL, CHEMICAL, AND ELECTRICAL PROPERTIES OF MARLEX (TRADE NAME) ETHYLENE POLYMERS,
Phillips Chemical Co Bartlesville Okla Plastics Sales Div
R. Vernon Jones, Paul J. Boeke, and Walter R. Clark. 1955, 12p
Prepared for presentation at the Annual Wire and Cable Symposium (4th), Asbury Park, N. J., December 6-8, 1955.

Descriptors: (*Polyethylene plastics, Physical properties), Chemical properties, Electrical properties, Electric insulation.

For utilization as insulation in the wire and cable industry, it appears that MARLEX ethylene polymers offer all the advantages of conventional polyethylene and, in addition, have extended the useful range of these thermoplastics in the following: (1) Increased softening temperature. (2) Improved abrasion resistance. (3) Extended environmental stress cracking time. (4) Decreased permeability to liquids and gases. (Author)
AD-656 383 HC$3.00 MF$0.65

DEVELOPMENT OF WEATHER-RESISTANT VINYL JACKETS,
Bakelite Co Bound Brook N J
E. E. Griesser, and W. T. Higgins. 1955, 28p
Annual Wire and Cable Symposium (4th), Asbury Park, N. J., December 7, 1955.

Descriptors: (*Vinyl plastics, Weatherproofing), (*Electric insulation, Vinyl plastics), Aging (Ma-

terials), Life expectancy, Carbon black, Test methods, Plastics, Stability, Plasticizers, Pigments, Colors, Performance (Engineering), Additives, Wear resistance.

A rapid method for the development of weather-resistant vinyl compounds was proposed based on an established correlation of accelerated vs. actual weathering performance. The ingredients of a typical vinyl compound were examined in the accelerated test. Improvements in actual weather resistance were predicted by proper selection of the resin, stabilizer, fillers and pigments. Plasticizer choice was based on compatibility, oxidation stability, and volatility tests. A list of stable colorants suitable for use in outdoor applications is given. Combining the best of these ingredients as predicted by the accelerated test resulted in a compound vastly improved in actual weather resistance. (Author)
AD-656 385 HC$3.00 MF$0.65

AUTOGENOUS EXTRUSION,
Western Electric Co Inc Baltimore Md
For primary bibliographic entry see Field 13H.
AD-656 387 HC$3.00 MF$0.65

RECENT DEVELOPMENTS IN POLYETHYLENE INSULATING MATERIALS,
Bakelite Co Bound Brook N J
R. J. Lurie, and J. A. Synder. 1955, 17p
Annual Wire and Cable Symposium (4th), Asbury Park, N. J., December 1955.

Descriptors: (*Polyethylene plastics, *Electric insulation), Electric wire, Plastic coatings, Electric cables, Mechanical properties, Polymers, Molecular weight, Deformation, High-pressure research, Low-pressure research, Dielectric properties.

The commercial importance of polyethylene was first recognized during the war in wire and cable applications where it was employed as an outstanding flexible dielectric. For once a material was available which combined excellent dielectric properties, chemical, oil, moisture and oxidation resistance with low temperature flexibility, high tensile strength, and elongation. This excellent reputation has been based mainly on one class of polyethylene polymers which has been varied to a slight degree in crystallinity and molecular weight. Since such advances were made with one polymer type it was natural to investigate the possibilities of property variation through more extensive polymer changes. It was realized, however, that more rigid polymers would not supplant presently available polymers in the majority of applications, but rather would result in an overall expanded use of polyethylene in many industries. An example may be seen in wire and cable applications. Where thin-walled insulations of high strength are required, new polymers which have high rigidity will be of particular value. On the other hand, in large cable applications where a thick-walled jacket is required, the new polymers would have limited use due to this rigidity.
AD-656 388 HC$3.00 MF$0.65

GENERAL PROPERTIES OF THE NEW SUPER-POLYETHYLENES,
Koppers Co Inc Pittsburgh Pa
George H. Sollenberger. 1955, 7p
Prepared for presentation at the Annual Wire and Cable Symposium (4th), Asbury Park, N. J., December 1955.

Descriptors: (*Polyethylene plastics, Physical properties), Thermal properties, Impact shock, Shock resistance, Tensile properties, Permeability, Mechanical properties, Surface properties, Colors, Processing, Extrusion.

The super-polyethylenes offer an unusual combination of properties: Improved heat resistance, greater rigidity, excellent low temperature impact strength, high tensile strength, and excellent appearance. It is this combination of properties which will fill a long-standing need and will complement other materials by broadening the entire spectrum of plastics applications. (Author)
AD-656 389 HC$3.00 MF$0.65

CHEMICALLY CROSS-LINKED POLYETHYLENE,
General Electric Co Bridgeport Conn Wire and Cable Dept
E. R. Kerwin. Dec 58, 16p
Annual Wire and Cable Symposium (7th) on technical Progress in Communication Wires and Cables, Asbury Park, N. J., 2-4 Dec 58.

Descriptors: (*Polyethylene plastics, Crosslinking (Chemistry)), (*Electric insulation, Polyethylene plastics), Electrical properties, Thermal properties, Plastic coatings, Electric wire, Tensile properties, Electric cables, Wear resistance, Shock resistance, Aging (Materials).

Present Vulkene compounds admittedly do not equal the electrical properties of conventional polyethylene, however, they are comparable and the over-all properties are superior to many thermoplastic and thermosetting insulations used in a wide variety of applications. Significant advantages can be realized with Vulkene in installations involving one or more of the following conditions: (1) Overloads and short circuits; (2) High ambients; (3) Exposure to solvents and chemical reagents; (4) Abrasion and impact problems; (5) Low temperature operation, particularly in cases where the cable may be subject to impacts. The full potential of Vulkene has not been realized. Substantial strides are being made in compounding and in the use of other cross linking agents that should substantially improve the electrical characteristics without appreciably altering the excellent thermal properties achieved with this material. Line wire, control cable and power cable applications are all being studied. Hook-up wire is another candidate to provide an economical answer to shrink-back and damaged insulation commonly experienced in making soldered connections and maintaining electronic equipment. Coloring and striping do not seem to present any problem but various manufacturing techniques will have to be perfected before this goal is fully realized. (Author)
AD-656 390 HC$3.00 MF$0.65

FOAMED POLYETHYLENE COAXIAL CABLES,
American Phenolic Corp Chicago Ill
For primary bibliographic entry see Field 9A.
AD-656 402 HC$3.00 MF$0.65

HIGH-TEMPERATURE AIRCRAFT WIRES,
General Electric Co Bridgeport Conn
For primary bibliographic entry see Field 9A.
AD-656 403 HC$3.00 MF$0.65

THE TESTING OF POLYVINYLCHLORIDE ELECTRICAL FORMULATIONS,
Monsanto Chemical Co St Louis Mo
George W. Ashworth, Joseph R. Darby, William E. Koerner, and Ralph H. Munch. 1967, 27p

Descriptors: (*Polyvinyl chloride, Test methods), Electric insulation, Plasticizers, Liquid immersion tests, Resistance (Electrical), Additives, Electrical properties.

Data are presented which show that test methods which closely simulate specification conditions must be used to measure accurately the electrical quality of insulating materials and their ingredients. A novel molded specimen for studying the long-term water immersion resistivity of polyvinyl chloride electrical insulating compounds has been developed. It permits determining the quality of ingredients used in such compounds at much lower cost using smaller amounts of material, simpler equipment and much less space. Up to 84 samples can be tested in a 1.5 ft. x 2 ft. x 1 ft. bath. (Author)
AD-656 404 HC$3.00 MF$0.65

LOW LOSS CABLE FOR MICROWAVE SERVICE,
ITT Federal Labs Nutley N J
For primary bibliographic entry see Field 9A.
AD-656 408 HC$3.00 MF$0.65

EXTRUSION OF FAST CURING NEOPRENE WIRE AND CABLE COMPOUNDS,
Du Pont de Nemours (E I) and Co Wilmington Del Elastomers Div
For primary bibliographic entry see Field 13H.
AD-656 413 HC$3.00 MF$0.65

THE INTERRELATIONSHIP BETWEEN DENSITY AND DIELECTRIC STRENGTH OF HIGH PRESSURE POLYETHYLENE FOR HIGH VOLTAGE APPLICATIONS IN INSULATED WIRES,
Royal Electric Corp Pawtucket R I
Albert S. Silver. Dec 57, 12p
Annual Wire and Cable Symposium (6th) at Asbury Park, N. J., 3-5 Dec 57.

Descriptors: (*Polyethylene plastics, Electric insulation), Electric wire, Density, Dielectric properties, Crystallization, Data, Electric cables.

Data is presented which shows that branched P. E. manufactured by the high pressure system must be insulated properly in order to maintain a high density and crystallinity to give maximum dielectric strength in cable. (Author)
AD-656 418 HC$3.00 MF$0.65

EVALUATION OF CARBON BLACK DISPERSIONS IN POLYETHYLENE TO PREDICT WEATHERABILITY,
Tennessee Eastman Co Kingsport
Roger M. Schulken, Jr., Gordon C. Newland, and John W. Tamblyn. 1957, 28p
Annual Wire and Cable Symposium (6th), Asbury Park, N. J., December 3-5, 1957.

Descriptors: (*Polyethylene plastics, Degradation), (*Carbon black, Weatherproofing), Scattering, Aging (Materials), Predictions, Films, Absorption.

Pending further weathering data, it seems reasonable to conclude tentatively that a carefully standardized absorptivity measurement at a fixed film thickness with white light can give a useful prediction of the weatherability of polyethylene pigmented with carbon black. It is also concluded that the best dispersions of carbon black in polyethylene presently available are probably about as good as can be made, since their absorptivity equals that of evaporated carbon films. The low-power microscope dispersion ratings cannot be considered to give very reliable forecasts of weatherability. (Author)
AD-656 419 HC$3.00 MF$0.65

BULK HANDLING OF POLYETHYLENE IN CABLE MANUFACTURING,
Western Electric Co Inc Baltimore Md
M. G. Dinsmore, Jr. Dec 57, 13p
Annual Wire and Cable Symposium (6th) at Asbury Park, N. J., 3-5 Dec 57.

Descriptors: (*Polyethylene plastics, Handling), Containers, Conveyors, Storage, Electric cables, Industrial production.

The article describes the bulk handling systems for polyethylene granules in a cable manufacturing

plant. The system utilizers Sealdbin containers and pneumatic conveyors.
AD-656 420 HC$3.00 MF$0.65

TECHNIQUES FOR INSULATING WIRE AND CABLE WITH SILICONE RUBBER,
Dow Corning Corp Midland Mich
For primary bibliographic entry see Field 13H.
AD-656 421 HC$3.00 MF$0.65

THE EXTRUSION OF 'TEFLON' 100X PERFLUROCARBON RESIN: A NEW MELT EXTRUDABLE MATERIAL FOR WIRE INSULATION,
Du Pont de Nemours (E I) and Co Wilmington Del Polychemicals Dept
For primary bibliographic entry see Field 13H.
AD-656 423 HC$3.00 MF$0.65

IMPROVED POLYVINYL CHLORIDE INSULATION FOR 105C SERVICE,
Goodrich (B F) Chemical Co Cleveland Ohio
H. L. Wuerth. 1955, 5p
Annual Wire and Cable Symposium, Asbury Park, N. J., December 6, 1955.

Descriptors: (*Electric insulation, Polyvinyl chloride), (*Polyvinyl chloride, Thermal properties), Physical properties, Mechanical properties, Thermal stability, Electrical properties, Extrusion.
Identifiers: Geon plastics.

The applicability of a proprietary polyvinyl chloride (Geon Plastic 8800) as insulation for commercial and military hook-up and appliance wire is demonstrated. The material is acceptable for service at 105C.
AD-656 499 HC$3.00 MF$0.65

THE EFFECT OF CARBON BLACK SURFACE PROPERTIES ON THE STABILITY OF POLYETHYLENE,
Acheson Dispersed Pigments Co Philadelphia Pa
For primary bibliographic entry see Field 11G.
AD-656 501 HC$3.00 MF$0.65

SOME CONSIDERATIONS ON THE USE OF HIGH DENSITY POLYTHENE IN THE CABLE INDUSTRY,
Imperial Chemical Industries Ltd Wellwyn Garden City (England) Plastics Div
D. Grant. 1956, 21p
Annual Wire and Cable Symposium (5th), Asbury Park, N. J., December 5, 1956.

Descriptors: (*Polyethylene plastics, Electric insulation), Electric cables, Physical properties, Electrical properties, Mechanical properties, Transmission lines, Oxidation.

The physical properties of high density polythenes make these materials immediately attractive to the cable manufacturer. Their improved mechanical properties, abrasion resistance, and resistance to deformation at high temperatures should enable the cable designer to cut the cost of most cables, either by a reduction in raw material usage or by increasing the rating for a given size of cable. This assumes that the price of high density polythenes will not be significantly higher than conventional polythene once they are in full scale production. The data available on the properties of these new plythenes is still very meagre and does not permit a clear assessment of their potentialities to be made. The short term accelerated tests reported here, indicate that in some of the fundamental properties high density polythenes are inferior to the conventional material. The tendency of high density polythenes to be brittle, as shown by their low elongation at break at high rates of strain and the high notch sensitivity at low temperatures, may well restrict their use. The embrittlement at high temperatures when under stress, and the oxidation characteristics, are not at present fully understood, and they raise queries as to the service life which can be expected from the new materials.
AD-656 502 HC$3.00 MF$0.65

'KEL-F' 500, A NEW FLUOROCARBON WIRE INSULATING MATERIAL,
Kellogg (M W) Co Jersey City N J
J. A. Jupa. Dec 56, 12p
Annual Wire and Cable Symposium (5th) at Asbury Park, N. J., 4-6 Dec 56.

Descriptors: (*Halocarbon plastics, *Electric insulation), Electric wire, Mechanical properties, Electrical properties, Plastic coatings, Extrusion, Physical properties, Aging (Materials).

'KEL-F' 500-F retains the same extreme chemical resistance, low temperature flexibility, outstanding electrical characteristics, zero moisture absorption, high mechanical and physical properties, and abrasion resistance as our regular 'KEL-F' grades 270 and 300. The foregoing characteristics are of special interest to the wire coating field. In addition to these qualifications, 'KEL-F' 500-F offers higher continuous heat aging resistance, namely, at temperatures of 150 to 175C., greater flexibility and improved resistance to radiation. (Author)
AD-656 504 HC$3.00 MF$0.65

NEW DEVELOPMENTS IN SILICONE RUBBER FOR ELECTRICAL TAPES,
General Electric Co Waterford N Y Silicone Products Dept
J. S. Hurley, Jr. Dec 56, 16p
Annual Wire and Cable Symposium (5th) at Asbury Park, N. J., 4-6 Dec 56.

Descriptors: (*Silicone plastics, Tapes), (*Tapes, *Electric insulation), Electrical properties, Mechanical properties, Physical properties.

Topics included are: physical properties, silicone rubber in wire and cable, silicone rubber tapes, specific inductive capacity, power factor, cure Vs electrical properties, and semicured tapes.
AD-656 505 HC$3.00 MF$0.65

HI-FAX POTENTIALS IN THE WIRE AND CABLE INDUSTRY,
Hercules Powder Co Wilmington Del
J. B. Martin, W. O. Bracken, and E. W. Cronin. 1967, 15p

Descriptors: (*Polyethylene plastics, Electrical properties), Physical properties, Wear resistance, Corrosion resistance, Thermal properties, Structural properties, Electric insulation, Plastic coatings, Manufacturing methods.

Hi-fax, with its electrical characteristics and its resistance to heat, abrasion, cut-through, and stress corrosion has properties which will be utilized in both the communication and power cable fields.
AD-656 509 HC$3.00 MF$0.65

THE USE OF IRRATHENE IRRADIATED POLYETHYLENE IN WIRE AND CABLE,
General Electric Co Pittsfield Mass Chemical Development Dept
Kenneth J. Mackenzie. 1956, 16p
Annual Wire and Cable Symposium, Asbury Park, N. J., December 4-6, 1956.

Descriptors: (*Electric insulation, Polyethylene plastics), (*Polyethylene plastics, Acceptability), Physical properties, Electrical properties, Mechanical properties, Thermal properties, Resistance (Electrical), Leakage (Electrical), Semiconducting films, Tapes.
Identifiers: Irrathenes.

Recent developments and the newest products in the field of irradiated polyethylene are presented. The use of these materials in some typical wire and cable applications is also discussed. To summarize the advantages of Irrathene in these applications, the following qualities are of particular interest to the wire and cable industry: High dielectric strength; low power factor and dielectric constant, both of which are stable with temperature and frequency; non-melting; freedom from stress cracking; excellent tracking resistance; protection against voltage and thermal overloads; good mechanical and physical properties; good moisture and chemical resistance; the ability to shrink under controlled conditions to give a tight sealed wrap.
AD-656 512 HC$3.00 MF$0.65

THE EFFECT OF RADIATION ON POLYETHYLENE,
Bell Telephone Labs Inc Murray Hill N J
V. L. Lanza. 1956, 23p
Annual Wire and Cable Symposium (5th), Asbury Park, N. J., December 4, 5, and 6, 1956.

Descriptors: (*Polyethylene plastics, *Radiation damage), Tensile properties, Thermal properties, Aging (Materials), Dielectric properties, Brittleness.

Starting with a standard grade polyethylene or perhaps one of even lower molecular weight, it is possible by a judicious selection of irradiation dose to effect a marked increase in tensile strength without any significant loss in elongation; to convert a material of poor crack-resistance to one which has complete crack-resistance; to markedly improve the heat distortion of the polymer and to improve its weathering characteristics. All these beneficial improvements can be brought about without any significant loss in the excellent dielectric properties of polyethylene. It also appears that the addition of various essential ingredients (i.e., carbon black and antioxidant) did not affect the irradiation efficiency nor presumably were the additives adversely affected. Further study is, however, necessary to elucidate the effect of different additives under varying conditions. This study indicates that at a dose of somewhere in the range of 8 to 16 million reps optimum properties can be obtained.
AD-656 513 HC$3.00 MF$0.65

A PRACTICAL APPROACH TO THE EXTRUSION OF THERMOPLASTICS,
Du Pont de Nemours (E I) and Co Wilmington Del Polychemicals Dept
For primary bibliographic entry see Field 13H.
AD-656 514 HC$3.00 MF$0.65

THE EXTRUSION OF 'TEFLON' 6 TETRAFLUOROETHYLENE RESIN FOR WIRE INSULATION.
Du Pont de Nemours (E I) and Co Wilmington Del Polychemicals Dept
For primary bibliographic entry see Field 13H.
AD-656 515 HC$3.00 MF$0.65

NEW DEVELOPMENTS IN SILICONE RUBBER COMPOUNDS FOR EXTRUDED ELECTRICAL INSULATION,
General Electric Co Waterford N Y Silicone Products Dept
M. G. Noble. 1957, 15p

Descriptors: (*Silicone plastics, *Electric insulation), Extrusion, Aging (Materials), Additives, Curing agents, Physical properties, Electrical properties.

The paper covers recent developments in silicone rubber technology and, also, some fundamental data on physical and electrical properties.
AD-656 518 HC$3.00 MF$0.65

NEW DEVELOPMENTS IN CABLE JACKETING COMPOUNDS,
Bakelite Co New York
D. W. Dahringer, and W. T. Higgins. Dec 56, 18p Rept no. 1099
Annual Wire and Cable Symposium (5th) at Asbury Park, N. J., 5 Dec 56.

Descriptors: (*Polyvinyl chloride, Plastic coatings), Electric cables, Electrical properties, Mechanical properties, Electric insulation, Wear resistance.

A new vinyl chloride material was developed, BAKELITE Brand NFD-3000. This compound is a so-called 'internally plasticized' material which possesses adequate flexibility without the use of plasticizers or other modifiers. And this flexibility is available with no sacrifice of the other properties normally affected by adding plasticizers, such as electrical properties, toughness, and abrasion and deformation resistance. NFD-300 exhibits an unusual combination of the superior properties of rigid and plasticized vinyls.
AD-656 521 HC$3.00 MF$0.65

NYLON IN WIRE AND CABLE,
Du Pont de Nemours (E I) and Co Wilmington Del Polychemicals Dept
A. L. Gibson. 1956, 15p
Annual Wire and Cable Symposium (5th), Asbury Park, N. J., December 6, 1956.

Descriptors: (*Nylon, Physical properties), Electric cables, Electric wire, Wear resistance, Trees, Chemical properties, Thermal properties, Electrical properties, Mechanical properties.

Nylon is now moving into a wide variety of military and civilian uses. Its toughness, abrasion resistance, wide temperature range and chemical resistance are solving a host of serious service problems. This report describes a few of these applications and presents data on the properties of the family of 'Zytel' nylon resins. With wider knowledge of the properties, cable designers will be able to exploit 'Zytel' further, solving field problems and reducing costs.
AD-656 522 HC$3.00 MF$0.65

PROPERTIES OF HYPALON WIRE CONVERINGS,
Du Pont de Nemours (E I) and Co Wilmington Del Elastomers Div
For primary bibliographic entry see Field 11J.
AD-656 523 HC$3.00 MF$0.65

NEW IMPROVED POLYOLEFIN WIRE AND CABLE RESINS,
Phillips Petroleum Co Bartlesville Okla
R. J. Martinovich, J. N. Scott, F. W. Bailey, and J. E. Pritchard. 1964, 23p
Annual Wire and Cable Symposium, Dec 2-4, 1964.

Descriptors: (*Polyethylene plastics, Electrical properties), Electric cables, Stresses, Molecular weight, Toughness, Wear resistance, Plastics.

A number of new polyolefin wire and cable resins have recently been developed for a variety of communications, power and control applications. The purpose of this report is to present the latest information on new wire and cable polyolefin resins. Specifically, this report will be concerned with discussing the physical, electrical and rheological properties of: (a) a low density polyethylene resin with improved environmental stress crack resistance for sheathing applications, (b) a high density polyethylene resin with improved stress cracking and processing characteristics, and (c) an ultra-high molecular weight high density ethylene-butene copolymer with improved abrasion resistance and toughness. It should be noted that the three above mentioned resins are commercially available at this time. (Author)
AD-656 525 HC$3.00 MF$0.65

THE USE OF HEAT SHRINKABLE SILICONE RUBBER ON CABLES AND CABLE ASSEMBLIES,
Dow Corning Corp Midland Mich
For primary bibliographic entry see Field 9A.
AD-656 526 HC$3.00 MF$0.65

SOME ASPECTS OF THE STABILIZATION OF VINYL INSULATION,
National Lead Co Brooklyn N Y Research Labs
J. G. Hendricks, and N. L. Cooperman. 1957, 6p
Annual Wire and Cable Symposium (6th), December 3-5, 1957, Asbury Park, New Jersey.

Descriptors: (*Vinyl plastics, Electric insulation), Electric cables, Aging (Materials), Stabilization, Lubricants, Plasticizers, Plastic coatings.

Volume resistivity is influenced by many factors, the relative effect of each factor being dependent on the conditions selected to represent the other factors. Changes in materials or processes, instigated to improve resistivity, influence a spectrum of properties. This suggests that resistivity may be further enhanced and optimum overall benefits can be derived from re-balancing other components and re-investigating other possible materials in the new system. (Author)
AD-656 610 HC$3.00 MF$0.65

IRRADIATION 'FACTOR-DEPENDENCY'. STYRENE WITH ADDITIVES.
Quartermaster Research and Engineering Command Natick Mass
For primary bibliographic entry see Field 7E.
AD-656 760 HC$3.00 MF$0.65

APPLICATION OF COMPUTER FACILITIES FOR THE DETERMINATION OF SIZE DISTRIBUTION IN POLYMER LATICES.
Wayne State Univ., Detroit, Mich. Dept. of Chemistry.
For primary bibliographic entry see Field 9B.
AD-807 464 HC$3.00 MF$0.65

STRUCTURE ANALYSIS ON STEREOREGULAR POLYMETHYLMETHACRYLATE IN SOLUTIONS.
Technische Hogeschool, Eindhoven (Netherlands).
For primary bibliographic entry see Field 7D.
For abstract, see STAR 05 18.
N67-31659 HC$3.00 MF$0.65

POLYMERS FOR SPACECRAFT HARDWARE MONTHLY TECHNICAL PROGRESS REPORT, 10 FEB. 1967 - 1 MAR. 1967.
Stanford Research Inst., Menlo Park, Calif.
A. A. Koch, R. F. Muraca, and J. S. Whittick. 15 Mar 67, 32p NASA-CR-85614, MTPR-33
Contracts NAS7-100, JPL-950745
Prepared for Jpl

Descriptors: *Hardware, *Polymer, *Spacecraft structure, *Test program, Aluminum, Application, Constant, Decontamination, Dielectric, Epoxy, Exposure, Fluorocarbon, Glass, Isobutylene, Measurement, Polyamide, Polyester, Polyurethane, Program, Resin, Rubber, Shear, Silicone, Spacecraft, Strength, Structure, Test, Thermal, Treatment, Vacuum.

For abstract, see STAR 05 18.
N67-32398 HC$3.00 MF$0.65

STUDY TO DETERMINE THE THERMOPHYSICAL PROPERTIES OF ABLATIVE MATERIALS SUMMARY REPORT.
TRW Systems Group, Redondo Beach, Calif.
F. E. Arndt. Jun 67, 12p NASA-CR-65545, TRW-04812-6002-R000
Contract NAS9-4518

Descriptors: *Ablating material, *Phenol resin, *Thermophysical property, Ablation, Capacity, Char, Conductivity, Decomposition, Density, Diffusion, Heat, Material, Phenol, Property, Resin, Testing, Thermal, Thermophysical.

For abstract, see STAR 05 18.
N67-32581 HC$3.00 MF$0.65

DEVELOPMENT OF BLOOD-COMPATIBLE POLYMERIC MATERIALS.
Battelle Memorial Inst., Columbus, Ohio. Columbus Labs.
For primary bibliographic entry see Field 6A.
PB-175 668 HC$3.00 MF$0.65

11J. Rubbers

PHYSICAL AND MECHANICAL PROPERTIES OF POLY-m-CARBORANYLENESILOXANE COPOLYMERS.
Technical rept.,
Princeton Univ N J Frick Chemical Lab
H. Sperling, E. J. Zaganiaris, and A. V. Tobolsky. Jun 67, 16p
ONR-TR-RLT-98
Contract Nonr-1858 (07)

Descriptors: (*Heat-resistant plastics, Mechanical properties), (*Boranes, Elastomers), (*Siloxanes, Elastomers), (*Elastomers, Physical properties), Polymers, Modulus of elasticity, Thermal stability, Transition temperature, Melting point, Oxidation, Crosslinking (Chemistry), Stresses.
Identifiers: Poly (carboranylenesiloxanes)

The physical and mechanical properties of a series of random copolymers of SiB-1 and SiB-2 were investigated. Modulus-temperature data yielded Tg, the glass transition temperature, Tm, the melting temperature, and Tox, the temperature of rapid oxidative crosslinking. Stress relaxation and weight loss data were also obtained on selected copolymers. These copolymers all have outstanding high temperature properties, which improve with lowered SiB number. (Author)
AD-656 049 HC$3.00 MF$0.65

THE MODIFICATION OF BUTYL RUBBER WITH POLYETHYLENE FOR WIRE AND CABLE,
Polymer Corp Ltd Sarnia (Ontario)
J. J. Danic, D. C. Edwards, and J. Walker. 1963, 51p
Annual Wire and Cable Symposium (12th) 4-6 Dec 1963.

Descriptors: (*Butyl rubber, *Polyethylene plastics), Composite materials, Additives, Crosslinking (Chemistry), Peroxides, Curing agents, Permeability, Processing, Physical properties, Electric insulation.

It was demonstrated that Butyl rubber can be modified with polyolefins by chemically reacting the two components, with chlorinated melamines and a metal oxide resulting in a considerable improvement in ozone resistance compared to simple physical blends. Many of the properties of such blends can be altered according to the type and the amount of polyolefin used. The reacted blends can be used alone or added to regular Butyl compounds and have the following general properties: (a) Good oil and fuel resistance, particularly to aromatic fuels; (b) Excellent chemical resistance; (c) Good electrical properties; (d) Highly ozone resistant; (e) Low permeability; (f) Low temperature flexibility below -50C; (g) Low water absorption; (h) Can be processed on conventional rubber

equipment; (i) Extrudes smoothly with low die swell. Throughout the range of properties it is evident that the modification of Butyl rubber with polyolefins can result in practical advantages that will increase the range of applications for Butyl rubber. (Author)
AD-656 102 HC$3.00 MF$0.65

THE SIGNIFICANCE OF ACCELERATED AGING TESTING OF RUBBER INSULATION,
Anaconda Wire and Cable Co Marion Ind
T. H. Ling. 1963, 9p
Annual Wire and Cable Symposium, Asbury Park, N. J., December 4, 5 and 6, 1963.

Descriptors: (*Synthetic rubber, Electric insulation), (*Butyl rubber, Aging (Materials)), Degradation, Electric wire, Electric cables, Performance (Engineering).

The age deterioration of rubber insulation sandwiched between a conductor and a jacket is caused almost solely by heat or high temperature. The discrepancies between accelerated aging test results and cable performance are attributed to extraneous non-functional accelerating factors such as oxygen, air, or pressure introduced into these insulation aging tests. The object of using the accelerating factors is to speed up the evaluation. However, the basic objective of the aging tests is completely lost. It is recommended that the vacuum oven aging method be further investigated as a potential standard aging test method for rubber insulation. (Author)
AD-656 115 HC$3.00 MF$0.65

WATER ABSORPTION OF ELASTOMERS,
Polymer Corp Ltd Sarnia (Ontario)
G. J. Briggs, D. C. Edwards, and E. B. Storey. Jun 61, 32p

Descriptors: (*Elastomers, *Absorption), (*Hydrocarbons, Water), Tensile properties, Supercooling, Temperature, Polymers, Volume, Measurement, Nitrile rubber, Tables.

Considering that water is nearly insoluble in hydrocarbons, one might suppose that the uptake of water by hydrocarbon elastomers would be limited to small quantities, perhaps one or two percent. The reality is quite different; specimens exposed for extended periods, or at high temperatures, may absorb very large amounts of water, often several times the original specimen weight. Such effects have been reported for a variety of polymers. The present work was undertaken in the hope of clarifying the nature of these effects, and in the belief that it should prove possible to secure adequate water resistance with any of the common synthetic elastomers. (Author)
AD-656 173 HC$3.00 MF$0.65

SOME RECENT STUDIES OF ELECTRICAL GRADE FILLERS IN BUTYL RUBBER AND OTHER INSULATION MATERIALS,
Enjay Labs Linden N J
W. F. Fischer. 1967, 39p Rept no. ELD-22622

Descriptors: (*Butyl rubber, *Talc), (*Additives, *Electric insulation), Clay minerals, Dielectric properties, Physical properties, Polyethylene plastics, Polyvinyl chloride, Electrical properties.

Talc imparts a smooth surface to extruded articles, increases resistance to flow of uncured compounds, and may be of use in nonelectric molded and proofed goods where resistance to permeation by gases or liquids is desired. Promotion of the filler with a chemical agent like Elastopar improves uncured properties and increases cured modulus 20-30 per cent. Overall processing and physical property data on platy talc compounds detailed in the paper show no significant deficiencies in comparisons with calcined clay, calcium carbonate and other types of talc fillers in butyl rubber. A one-step mixing procedure for butyl-platy talc compounds is described. Comparisons of dielectric strength of platy talc with other fillers in polyethylene, polypropylene and polyvinyl chloride plastics indicate the platy talc sustains the high dielectric strength of the plastics at 1800-2000 volts per mil. Nonplaty mineral fillers tend to decrease resistance to electrical failure. (Author)
AD-656 191 HC$3.00 MF$0.65

DEGRADATION OF POLYMERS BY EXTERNAL CORONA DISCHARGE,
Anaconda Wire and Cable Co Hastings-on-Hudson N Y
R. F. Grossman. 1960, 9p Rept no. Pub-C-114

Descriptors: (*Synthetic rubber, Degradation), (*Polyethylene plastics, Degradation), (*Polyvinyl chloride, Degradation), (*Electrical corona, Degradation), Electron bombardment, Ozone, Butyl rubber, Dielectrics, Dielectric properties.

A study was made to relate the processes of ozone attack and electron bombardment to the failure of various rubbers and plastics under corona.
AD-656 198 HC$3.00 MF$0.65

COLD GR-S POLYMERS FOR WIRE INSULATION,
United States Rubber Co Naugatuck Conn Chemical Div
L. H. Howland, R. W. Brown, and C. W. Lawson. 1959, 11p

Descriptors: (*Synthetic rubber, Electric insulation), Polymerization, Butadienes, Styrene plastics, Plastic coatings, Physical properties, Aging (Materials).

Several cold GR-S polymers were prepared and tested for use as insulating and jacketing materials for wire. Three of these have reached the production stage. The improvements of cold over hot GR-S, while perhaps not as great as in tire tread stocks, are sufficient to have caused a change of about 50% of the wire insulation polymer production from the hot to cold types. (Author)
AD-656 271 HC$3.00 MF$0.65

BUTYL POLYMER COMPOUNDING FOR INSULATIONS,
Southern Clays Inc New York
Emil W. Schwartz. 1954, 13p
Annual Wire and Cable Symposium (3rd), Asbury Park, N. J., December 7,8,9, 1954.

Descriptors: (*Butyl rubber, Electric insulation), Curing agents, Aging (Materials), Processing, Quinones.

High temperature mixing aids not only in a very high degree of dispersion, but gives dense well cured stocks. High temperature mixes extrude smoothly. In Butyl stocks you can make or destroy electrical properties in your internal mixer. It is not so much to consider what you put into the compound, as to how you put your materials together. This is an old, old basic philosophy in insulation compounding, but in the system just discussed the best possible dispersion obtainable is a 'must'. We know of no rapid method of incorporating the Quinones or Red Lead so that uniform cures and stable electrical results can be obtained. This is the reason we use master batches of these materials. The Quinone - Red Lead system is extremely sensitive to variations in pH. The usual antioxidant type of amines retard the cures in open steam. This is the main reason we use FT Black, pH 8.5 or FF Black, pH 9.3. This type of high pH Black, while a mild retarder to prevent scorch, is more advantageous for CV cures than the amines. The use of sulfur with the Quinones seems to aid and smooth the cure in open steam, but in the GMF system it raises the water absorption with resultant progressive degradation of insulation resistance values. This does not apparently happen with Di-Benzo GMF - Red Lead system. (Author)
AD-656 272 HC$3.00 MF$0.65

ENJAY BUTYL IN LOW VOLTAGE APPLICATIONS,
Enjay Labs Linden N J
W. F. Fischer, and W. C. Smith. 1959, 30p Rept no. ELD-12852

Descriptors: (*Butyl rubber, *Electric insulation), Rubber coatings, Electric wire, Electric cables, Electrical properties, Antioxidants.

A considerable amount of rubber is used to insulate power and communication wire designed for service under 600 volts. Two promising butyl compounds, one black and one light colored, have been developed to meet these service requirements. Composition data and properties are shown in Table I. The black compound (1) meets initial physical and electrical requirements for low voltage block (telephone ringing circuit) and power wire insulation, and has proved good long term weatherability. The light compound (2) was developed more recently as color-coded insulation for multiconductor drop (pole to house) wire. This latter material may be of greater long range importance since it is tougher, snappier, and has better electrical and compression properties. Based on laboratory tests, both of these new materials have demonstrated better electrical properties, superior heat stability, and much lower water absorption than the competitive elastomer jacket compounds currently in use. The butyl compounds also feature a one-step extrusion process which renders them especially attractive in comparison with the two-step insulation-jacket combination process used with other materials. This has been confirmed in successful trials conducted on the butyl formulations in both communications and power wire applications. (Author)
AD-656 284 HC$3.00 MF$0.65

INFLUENCE OF WATER IMMERSION ON ELECTRICAL CHARACTERISTICS OF SILICONE RUBBER,
Simplex Wire and Cable Co Cambridge Mass
M. G. Noble, and W. L. Seamonds. 1958, 18p
Annual Wire and Cable Symposium (Annual), Asbury Park, N. J., December 3, 1958. Prepared in cooperation with General Electric, Co.

Descriptors: (*Electric insulation, Stability), (*Silicone plastics, Stability), Elastomers, Water, Leakage (Electrical), Voltage, Additives, Thickness, Temperature, Moisture.

It is shown that such variables as filler, voltage, insulation wall and temperature exert significant influence on the electrical properties of silicone rubber-insulated wire when subjected to prolonged water-immersion tests. By proper filler selection, silicone rubber insulation can be obtained which will display improved stability under wet conditions. Voltage rating is dependent upon two variables--desired wall thickness and required immersion temperature. Long-term immersion demonstrated that silicone rubber has limited electrical stability in water as temperatures are increased. Compounds passed accelerated testing in water up to 70C. The stability of silicone rubber compared favorably with that of butyl rubber at that immersion temperature. It seems possible that silicone rubber could also withstand testing in 75C water. However, power cable insulation of silicone rubber, as presently compounded, cannot be recommended as resistant to accelerated testing in 90C water for more than short periods of time.
AD-656 285 HC$3.00 MF$0.65

LAYTEX INSULATION FOR COMMUNICATION AND CONTROL CABLES,
United States Rubber Co Bristol R I Bristol Plant
Charles J. Tappero. 1953, 11p

Annual Wire and Cable Symposium, Asbury Park, N.J., December 14, 15 and 16, 1953.

Descriptors: (*Rubber, *Electric insulation), (*Rubber coatings, Electric insulation), Electric cables, Synthetic rubber, Vulcanization, Electrical properties, Physical properties, Communication equipment, Control systems.

The development of Laytex insulation, its characteristics and its uses, are described briefly. Because of the special methods employed in its purification, compounding and compound application, this insulation exhibits outstanding electrical and physical properties. As a result, the high quality, excellent serviceability, long life, small diameter and light weight of Laytex insulation have led to its successful use in many types of wires and cables. (Author)
AD-656 321 HC$3.00 MF$0.65

HIGH VOLTAGE - HIGH TEMPERATURE RUBBER INSULATION,
Simplex Wire and Cable Co Cambridge Mass
W. H. Couch, and W. K. Freeman. Dec 53, 35p
Annual Wire and Cable Symposium (2nd), Asbury Park, N. J., 14-16 Dec 53.

Descriptors: (*Synthetic rubber, *Electric insulation), Heat-resistant materials, Voltage, Ozone, Aging (Materials), Electrical properties, Mechanical properties, Degradation, Performance (Engineering).

ANHYDREX XX is one of the new high voltage synthetic rubber compounds which have been developed to meet the need for a high-voltage rubber insulation, permitting higher conductor operating temperatures in wet or dry locations than previously possible. In order to withstand the increased severity of such service, it has been necessary to fortify the customary properties of the older types of high voltage insulation with improved behavior in water, increased ozone and corona resistance and with improved aging characteristics to insure stability for long periods of uninterrupted service. (Author)
AD-656 322 HC$3.00 MF$0.65

SILICONE INSULATED CABLE PRACTICE,
Signal Corps Engineering Labs Fort Monmouth NJ
H. T. Armitt. 1953, 12p
Prepared for presentation at the Symposium on Technical Progress in Communication Wires and Cables, Asbury Park, N. J., December 14, 15, 16, 1953.

Descriptors: (*Electric cables, Silicones), (*Silicones, Electric insulation), Rubber, Manufacturing methods, Extrusion, Vulcanization, Aging (Materials), Dielectric properties.

This report describes the manufacturing methods, electrical properties, and advantages of silicone rubber for use as a dielectric for cables.
AD-656 329 HC$3.00 MF$0.65

SILICONE RUBBER AS CABLE INSULATION,
Dow Corning Corp Midland Mich
For primary bibliographic entry see Field 9A.
AD-656 331 HC$3.00 MF$0.65

MILITARY APPLICATIONS OF SILICONE RUBBER INSULATED WIRE AND CABLE,
Dow Corning Corp Midland Mich
For primary bibliographic entry see Field 9A.
AD-656 378 HC$3.00 MF$0.65

COMPOUND FOR HEAT RESISTANT INSULATIONS AND JACKETS,
Vanderbilt (R T) Co Inc East Norwalk Conn Rubber Div
A. C. Rowley. 1957, 13p

Descriptors: (*Synthetic rubber, Heat-resistant materials), (*Electric insulation, Heat-resistant materials), (*Rubber coatings, Heat-resistant materials), Butyl rubber, Antioxidants, Aging (Materials), Additives, Curing agents, Elastomers.

The results of the compounding studies reported in this paper indicate ways in which superior heat aging performance suitable to meet that required by Underwriter's RHH designation may be built into Butyl Rubber and probably SBR for insulations, and into neoprene for jackets. SULFADS is shown to be a particularly valuable vulcanizing agent and accelerator for all three types of elastomer, when such superior agings are required. For Neoprene, an antioxidant combination of AGERITE STALITE, AGERITE SUPERLITE, and BUTYL ZIMATE has a strong protective action for elevated temperature service. (Author)
AD-656 414 HC$3.00 MF$0.65

PRE-DISPERSED ACCELERATORS IN RUBBER COMPOUNDS,
Ware Chemical Corp Westport Conn
John Ware. Dec 57, 19p
Annual Symposium on Technical Progress in Communication Wires and Cables (6th) at Asbury Park, N. J., 3-5 Dec 57.

Descriptors: (*Synthetic rubber, *Curing agents), Rubber coatings, Electric insulation, Sulfur, Aging (Materials), Scattering, Vulcanization.

The data indicates that dispersing sulfur permits the reduction of the amount used without sacrificing state of cure. With this reduction, heat aging is significantly improved. Even at the higher levels, heat aging is better if the sulfur is dispersed. There is some indication that the use of dispersions may give the compounder more latitude in time of cure which would reduce the trouble of over curing by making vulcanization time less critical. In general, there is evidence that pre-dispersing active rubber compounding chemicals changes their characteristics. It makes them more active or efficient but never the less safer to use. With the trend towards faster production, pre-dispersion offers better control in the factory. We cannot change the wettability of the base polymers to make up for the shorter milling cycle but we can employ dispersions to compensate. The additional cost of the dispersion may be balanced by better quality, saving of master batching, saving in milling time and less scrap. When Automation arrives, combination accelerations pre-dispersed will be essential. (Author)
AD-656 415 HC$3.00 MF$0.65

TECHNIQUES FOR INSULATING WIRE AND CABLE WITH SILICONE RUBBER,
Dow Corning Corp Midland Mich
For primary bibliographic entry see Field 13H.
AD-656 421 HC$3.00 MF$0.65

SYNTHESIS OF CARBORANE MODIFIED FLUOROCARBON ELASTOMERS.
Technical rept.,
Army Weapons Command Rock Island Ill Research and Engineering Div
L. G. Wiedenmann. Jun 67, 24p
RIA-67-1422

Descriptors: (*Heat-resistant materials, Elastomers), (*Elastomers, Synthesis (Chemistry)), (*Organoboranes, Polymerization), (*Halogenated hydrocarbons, Polymerization), Halocarbon plastics, Fluorine compounds, Bromine compounds, Catalysts, Copolymerization, Radiation chemistry, Spectra (Infrared), Differential thermal analysis.
Identifiers: Isopropyl bromotrifluoro vinylcarboranes, Carboranes.

C - isopropyl - c' - bromotrifluorovinylcarborane was synthesized. This did not polymerize with peroxide catalyst. The use of vinyl- or allylcarborane in peroxide initiated emulsion systems with commercial fluorocarbon monomers inhibited all polymerization except for one isolated case of a vinylidene fluoride-vinylcarborane resin. Here a copolymer was apparently formed. With Cobalt Co60 initiation, fluorocarbon polymer (TFE) was formed in the presence of allylcarborane. A mechanical mixture of a carborane and a fluorocarbon elastomer caused a decrease in the decomposition temperature, as evidenced by Differential Thermal Analysis. (Author)
AD-656 455 HC$3.00 MF$0.65

AGING OF NEOPRENE IN A WEATHEROMETER,
Army Signal Engineering Labs Fort Monmouth NJ
G. N. Vacca, and C. V. Lundberg. 1967, 30p

Descriptors: (*Synthetic rubber, Aging (Materials)), Rubber coatings, Life expectancy, Test methods, Test equipment, Performance (Engineering).

An investigation was made of the effect of comparatively long exposure of neoprene jackets in an accelerated weathering device. At the same time, it was hoped that the effect on weathering of lowering the neoprene content of a jacket could be determined. On the basis of the work done, it appears that a weatherometer such as the one used does not contribute materially to the estimation of expected outdoor service life of neoprene jackets. An accelerated ozone test in conjunction with a 100C air oven test gives a reliable criterion of expected service life in a comparatively short time, certainly much shorter than that required for the weatherometer test. In the case of GR-S jackets, however, the weatherometer may be much more useful.
AD-656 500 HC$3.00 MF$0.65

RESISTANCE OF RUBBER COVERED CABLE, JACKET, AND INSULATION STOCKS TO WEATHER AND ARTIFICIAL AGING,
Army Engineer Research and Development Labs Fort Belvoir Va
For primary bibliographic entry see Field 9A.
AD-656 516 HC$3.00 MF$0.65

PROPERTIES OF HYPALON WIRE CONVERINGS,
Du Pont de Nemours (E I) and Co Wilmington Del Elastomers Div
F. Wayne Keeley. 1956, 22p
Annual Wire and Cable Symposium (5th), Asbury Park, N. J., December 4, 1956.

Descriptors: (*Rubber coatings, Electric wire), Elastomers, Electrical properties, Physical properties, Aging (Materials), Electric cables.

It is evident from the test data presented in this paper that HYPALON wire coverings have exceptional electrical and physical stability under the many types of severe exposure conditions that can be encountered in wire and cable installations. Because of this, it is expected that it will find many applications in the manufacture of wire and cable. (Author)
AD-656 523 HC$3.00 MF$0.65

11L. Wood and Paper Products

APPALACHIAN HARDWOODS FOR PALLETS, A LABORATORY EVALUATION.
Research paper,
Forest Products Lab., Madison, Wis.
R. S. Kurtenacker, T. B. Heebink, and D. E. Dunmire. Jul 67, 23p FPL-76

Descriptors: (*Wood, *Pallets), Thickness, Design, Laboratories, Machining, Weight, Moisture, Tests.

A laboratory evaluation of the performance characteristics of pallets fabricated from three Appalachian hardwoods. Details of the various pallet designs evaluated for each wood species are presented, together with an analysis and comparison of their performance and a description of the laboratory test procedures. Results indicate that serviceable pallets of both the reusable or expendable types may be fabricated from any of the three most prevalent Appalachian hardwood species--yellow-poplar, oak, and hickory, although species and design tend to influence performance. (Author)
PB-175 683 HC$3.00 MF$0.65

12. MATHEMATICAL SCIENCES

12A. Mathematics and Statistics

A COMPUTER PROGRAM TO DETERMINE ACCEPTANCE CRITERIA AND THE OPERATING CHARACTERISTIC CURVE WHEN SAMPLING VARIABLES (QUALITY CONTROL).
Picatinny Arsenal Dover N J Ammunition Engineering Directorate
For primary bibliographic entry see Field 13H.
AD-655 849 HC$3.00 MF$0.65

DISCRETE SERIES FOR THE UNIVERSAL COVERING GROUP OF THE 3+1 de SITTER GROUP,
Cambridge Univ (England) Dept of Applied Mathematics and Theoretical Physics
N. T. Evans. 21 Feb 66, 16p
AFOSR-67-1620
Grant AF-EOAR-36-65
Availability: Published in Journal of Mathematical Physics v8 n2 p170-84 Feb 1967.

Descriptors: (*Groups (Mathematics), Series), (*Algebras, *Elementary particles), Classification, Matrix algebra, Operators (Mathematics), Transformations (Mathematics), Sequences, Invariance, Diagrams.

A classification is given of the irreducible unitary representations of the universal covering group of the 3 + 2 de Sitter group which contract to the usual physical representations of the Poincarre group. These representations include the discrete series for the 3 + 2 de Sitter group. The classification problem is reduced from one for the group to the corresponding one for the Lie algebra. The method used by Thomas for the representations of the 4 + 1 de Sitter group is then followed, except that a representation is reduced out with respect to the irreducible unitarity representations of a noncompact 2 + 2 subalgebra. It is conjectured that each representation of this subalgebra occurs at most once. The action on the representation spaces of a basis for the Lie algebra is given. The contractions of the representations to those of the Poincarre, oscillator and the Galilei groups are briefly considered.
AD-655 878 Not available from CFSTI.

ALTERNATIVE SCHEMES FOR INVESTIGATING MARKOV DECISION PROCESSES.
Massachusetts Inst of Tech Cambridge Operations Research Center
For primary bibliographic entry see Field 12B.
AD-655 893 HC$3.00 MF$0.65

THE MISSING DATA MATRIX,
Washington Univ Seattle
For primary bibliographic entry see Field 5J.
AD-655 916 HC$3.00 MF$0.65

CONFIGURAL ANALYSIS,
Washington Univ Seattle
For primary bibliographic entry see Field 5J.
AD-655 921 HC$3.00 MF$0.65

SINGULAR INTEGRAL OPERATORS ON A HALF-LINE,
California Univ Berkeley
Heinz O. Cordes, and Eugene A. Herman. 28 Sep 66, 8p
AFOSR-67-1738
Grant AF-AFOSR-553-64
Prepared in cooperation with Grinnell Coll., Iowa.
Availability: Published in Proceedings of the National Academy of Sciences v56 n6 p1668-73 Dec 1966.

Descriptors: (*Operators (Mathematics), Algebras), Integral equations, Theorems, Algebraic topology, Integral transforms, Mapping (Transformations), Inequalities, Hilbert space.

An algebra of singular integral operators defined over a half-line is discussed and a necessary and sufficient condition for its operators to be Fredholm is given. The sigma-symbol of this algebra is defined over a circle; an explicit index-formula results. The algebra contains the operators d/dx (- d superscript 2/dx superscript 2) raised to the -1/2 power for the Dirichlet and Neumann boundary condition du/dx + hu = 0, at x = 0. (Author)
AD-655 949 Not available from CFSTI.

GREEN'S THEOREM AND INVARIANT TRANSFORMATIONS,
Syracuse Univ N Y Dept of Physics
For primary bibliographic entry see Field 20J.
AD-655 964 HC$3.00 MF$0.65

GENERATION OF ALL HAMILTONIAN CIRCUITS, PATHS, AND CENTERS OF A GRAPH AND RELATED PROBLEMS,
Northwestern Univ Evanston Ill Dept of Electrical Engineering
S. S. Yau. 29 Jun 66, 4p
AFOSR-67-1727
Grant AF-AFOSR-98-65
Availability: Published in IEEE Transactions on Circuit Theory vCT14 n1 p79-81 Mar 1967.

Descriptors: (*Graphics, *Hamiltonian), Algorithms, Set theory, Feedback, Matrix algebra.

An algorithm for generating all Hamiltonian circuits, paths and centers of a graph is presented. This algorithm is applicable to both directed and undirected graphs and can easily be programmed on a digital computer. This algorithm also leads to the generation of all minimal feedback sets, and the longest path and the longest circuit of a graph. (Author)
AD-655 970 Not available from CFSTI.

ON A CONJECTURE OF B.L. van der WAERDEN,
California Univ Santa Barbara
Marvin Marcus, and Henryk Minc. 5 Jul 66, 7p
AFOSR-67-1716
Grants AF-AFOSR-698-65, AF-AFOSR-432-63
Availability: Published in Proc. Camb. Phil. Soc. v63 p305-9 1967.

Descriptors: (*Matrix algebra, Stochastic processes), Inequalities, Theorems, Sequences, Mathematics.
Identifiers: Eigenvalues.

In this paper, a conjecture is made which is stronger than the original van der Waerden conjecture concerning the permanent of a doubly stochastic matrix. In particular, if S is an n-square doubly stochastic matrix then per (S) = or ≥ per (nJ sub n -S)/ (n-1). In this paper, the conjecture is proved in the event that S is doubly stochastic positive semi-definite symmetric. Moreover, it is proved that if n = or > 3 then equality can hold if and only if S is the matrix with every entry equal to 1/n. (Author)
AD-655 980 Not available from CFSTI.

THE CONCEPT OF A FILTER,
Johns Hopkins Univ Baltimore Md
E. J. Hannan. 16 Nov 65, 9p
AFOSR-67-1649
Contract AF 49 (638)-1302
Prepared in cooperation with Australian National Univ., Canberra.
Availability: Published in Proc. Camb. Phil. Soc v63 p221-7 1967.

Descriptors: (*Functions, Mathematics), Operators (Mathematics), Hilbert space, Theorems, Random variables, Groups (Mathematics), Measure theory.
Identifiers: Response function, Filter (Mathematics).

It is proved that for a second-order, homogeneous, random process on a globally symmetric space a filter, that is a closed linear operator which is invariant under a group of isometries of the space, may be fully described through a response function, that is, that it has a direct integral decomposition into components which are scalar multiples of the identity. (Author)
AD-655 982 Not available from CFSTI.

FUNCTIONAL LAGRANGE EXPANSION IN STATE SPACE AND THE s-DOMAIN.
Revised ed.,
Washington Univ St Louis Mo
D. Gorman, and J. Zaborszky. 11 Apr 66, 10p
AFOSR-67-1706
Grant AF-AFOSR-482-65
Revision of manuscript submitted 4 Jan 66.
Availability: Published in IEEE Transactions on Automatic Control VAC11 n3 p498-505 Jul 1966.

Descriptors: (*Integral transforms, Operators (Mathematics)), (*Automation, Mathematical models), (*Control, Optimization), Analytic functions, Design, Mathematics, Green's function, Banach space, Functional analysis, Convergence.

This work introduces for the first time a method for explicitly solving a class of vector functional operator equations or their equivalents in the s-domain of the Laplace transforms. The class of functional equations is an important one both in Automatic Control and other fields of engineering and science. Examples of some areas of potential application are included. (Author)
AD-655 987 Not available from CFSTI.

DOMAINS OF ATTRACTION OF SOME QUASI-PERIODIC SOLUTIONS,
Brown Univ Providence R I Div of Applied Mathematics
P. R. Sethna. 1967, 12p
AFOSR-67-1648
Grant AF-AFOSR-704-66
Availability: Published in Differential Equations Dynamical Systems p323-32 1967.

Descriptors: (*Differential equations, Theorems), Periodic variations, Hamiltonian, Mathematics.
Identifiers: Lyapunov functions.

Previous results pertaining to the domains of attractions of periodic solutions of weakly nonlinear systems are generalized to the quasiperiodic case. Explicit estimates for domains of attractions of quasiperiodic solutions of weakly nonlinear nonautonomous dynamical systems with cubic nonlinearities are obtained. This study includes a method of obtaining the necessary Liapunov functions for such systems. (Author)
AD-655 990 Not available from CFSTI.

MAGGIORAZIONI INTERPOLATORIE NEGLI SPAZI (Interpolative Estimates in Certain Sobolev Spaces),
Pisa Univ (Italy) Istituto Matematico
Sergio Campanato. 1967, 21p
AFOSR-67-1713
Grant AF-EOAR-38-67
Text in Italian.
Availability: Published in Annali di Matematica pura ed Applicata v75 p267-76 1967

Descriptors: (*Mapping (Transformations), Mathematics), Inequalities, Integral equations, Theorems, Series.
Identifiers: Sobolev's space.

Some estimates are proved that can be viewed as a generalization of a classical Poincare's inequality. One deduces from these estimates some inequalities for interpolating functions between H (subscript lambda, superscript m, P) and H (superscript 2p) intersection L (superscript Po, lambda). (Author)
AD-656 007 Not available from CFSTI.

AMPLITUDE BOUNDS ON PERIODIC AND APERIODIC OSCILLATIONS: SECOND-ORDER SYSTEMS.
Revised ed.,
Texas Univ Austin Dept of Electrical Engineering
J. K. Aggarwal. 10 Jan 66, 18p
AFOSR-67-1776
Grant AF-AFOSR-766-67
Revision of manuscript submitted 19 Jul 65.
Availability: Published in Journal of the Inst. of Mathematics and Its Applications v3 n2 p202-15 Jun 1967.

Descriptors: (*Differential equations, Periodic variations), Polynomials, Trajectories, Mathematical analysis, Curve fitting, Boundary value problems, Numerical analysis.

The global behaviour of the control systems described by the pair of differential equations dx/dt = -f (x) plus or minus g (y) + p (t), dy/dt = plus or minus h (x) - k (y) + q (t) has been investigated. Here f (x), g (y), h (x) and k (y) are polynomials of odd degree with leading coefficients positive and p (t) and q (t) are bounded functions of time. Sufficient conditions have been found under which the trajectories of the above system may eventually be confined in a subset of (x,y,t)-space, thus giving bounds on the amplitude of periodic as well as aperiodic oscillations. Further bounds on the amplitude of oscillations have been investigated by finding regions in (x,y,t)-space from which all trajectories eventually leave and into which no trajectories enter. Thus sufficient conditions have been derived for the existence of an annulus in which oscillatory behaviour may be confined. (Author)
AD-656 015 Not available from CFSTI.

SOLUTION OF A CLASS OF SINGULAR INTEGRAL EQUATIONS.
Revised ed.,
Minnesota Univ Minneapolis
T. Lundgren, and D. Chiang. 16 Mar 66, 14p
AFOSR-67-1784
Contract AF 33 (615)-2341
Revision of manuscript submitted 9 Nov 65.
Availability: Published in Quarterly of Applied Mathematics v24 n4 p303-13 Jan 1967.

Descriptors: (*Integral equations, *Magnetohydrodynamics), Integral transforms, Analytic functions, Special functions (Mathematical), Mathematical analysis.

Consider the two integral equations (1) the integral between 0 and 1 of F (y) ((the absolute value of x-y) to the -alpha power) dy = f (x), 0 < alpha < 1 (2) the integral between 0 and 1 of F (y) (((the absolute value of x-y) to the -alpha power) sgn (x-y)dy = F (x), 0 < alpha < 1 differing from one another only in the occurrence of the algebraic sign of (x-y) in the kernel of equation (2). Equation (1) has been solved by Carleman. The solution of equation (2) which has not been given in the literature was obtained by a double use of the Wiener-Hopf Technique. It was shown that the formal limit as alpha approaches 1 in the solution of equation (2) above is the same as the solution of (3) P. V. the integral between 0 and 1 of (F (y)/ (x-y))dy = f (x) which has been treated by Muskhelishvili and others. A solution of Carleman's equation is obtained and also a solution of the more general equation (4) the integral between 0 and 1 of F (y) (the absolute value of x-y) to the (m-alpha) power (sgn (x-y)) to the nth power dy = f (x), is obtained from equations (1) and (2) above where m is a positive integer and n is zero or one. (Author)
AD-656 026 Not available from CFSTI.

ASYMPTOTIC NORMALITY OF THE MAXIMUM LIKELIHOOD ESTIMATE IN MARKOV PROCESSES.
Technical rept.,
Wisconsin Univ Madison Dept of Statistics
George G. Roussas. May 67, 15p Rept no. TR-115
Contract Nonr-1202 (17), Grant NSF-GP-6242

Descriptors: (*Statistical processes, Theorems), Probability, Random variables, Measure theory, Statistical analysis, Inequalities.
Identifiers: Maximum likelihood, Euclidean space.

In the present paper asymptotic normality of the maximum likelihood estimate in Markov Processes is established under conditions slightly weaker than the ones usually found in the literature. (Author)
AD-656 032 HC$3.00 MF$0.65

AN ASYMPTOTIC EXPANSION FOR POSTERIOR DISTRIBUTIONS.
Technical rept.,
Wisconsin Univ Madison Dept of Statistics
R. A. Johnson. May 67, 16p Rept no. TR-114
Contract Nonr-1202, Grant NSF-GP-3816

Descriptors: (*Statistical analysis, Theorems), Exponential functions, Random variables, Sequences, Theses, Stochastic processes, Probability density functions.
Identifiers: Euclidean space, Density functions.

We obtain an asymptotic expansion for the centered and scaled posterior distribution when the observations are drawn from a member of the one-parameter exponential family. The first few terms are calculated in order to show the manner in which the prior distribution enters. (Author)
AD-656 033 HC$3.00 MF$0.65

EIGENVALUE PROBLEM IN A LINEARLY DEPENDENT BASIS AND THE SUPER SECULAR EQUATION,
Uppsala Univ (Sweden) Quantum Chemistry Group
For primary bibliographic entry see Field 20J.
AD-656 038 Not available from CFSTI.

DETECTION OF CHANGES IN CHARACTERISTICS OF A GAUSS-MARKOV PROCESS.
Technical rept.,
Harvard Univ Cambridge Mass Div of Engineering and Applied Physics
P. M. Newbold, and Y. C. Ho. Jun 67, 40p Rept no. TR-531
Contract Nonr-1866 (16), Grant NGR-22-007-068

Descriptors: (*Statistical processes, Sequential analysis), (*Gyroscopes, Malfunctions), Probability, Decision theory, Sampling, Sequences, Iterative methods, Navigation, Errors, Detection.
Identifiers: Likelihood, Kalman filters.

By an extension to the theory of sequential detection with dependent measurements, it is possible to develop a Sequential Probability Ratio Test (SPRT) to detect changes in regime in a Gauss-Markov Process rather than detecting which of two regimes exist. It is shown how a posterior form of this extended SPRT may be simplified to reduce computational complexity. The simplified SPRT's are in fact modifications of the original SPRT detecting the regime and not the change. The tests are applied to the problem of fault detection in a gyro navigational system: the results of a detailed computer simulation are given. (Author)
AD-656 043 HC$3.00 MF$0.65

MEASUREMENTS AND SINGLE-VELOCITY CALCULATIONS OF DIFFERENTIAL ANGULAR THERMAL-NEUTRON ALBEDOS FOR CONCRETE,
Oak Ridge National Lab Tenn
For primary bibliographic entry see Field 11B.
AD-656 085 HC$3.00 MF$0.65

LINEAR POSITIVE MACHINES,
Colorado Univ Boulder
Richard S. Bucy. 1967, 8p
AFOSR-67-1740
Grant AF-AFOSR-1076-66
Prepared in cooperation with RAND Corp., Santa Monica, Calif., under contract AF 49 (683)-700.
Availability: Published in Journal of Computer and System Sciences v1 n1 p24-8 Apr 1967.

Descriptors: (*Algebras, Theorems), Inequalities, Matrix algebra, Automata, Control, Mathematics.

The analogy of the Krohn-Rhodes theory of finite state machines is developed for linear positive machines with inputs from a commutative Banach algebra with involution. The notion of prime machine in this context is shown to correspond maximal ideal in the input algebra. Further, every positive machine is shown to lie in the closed convex hull of its primes. (Author)
AD-656 132 Not available from CFSTI.

CONVERGENCE OF THE SERIES EXPANSION FOR THE THOMAS-FERMI FUNCTION,
Stanford Univ Calif Dept of Physics
James E. Enstrom. 8 Aug 66, 4p
AFOSR-67-1717
Contract AF 49 (638)-1389
Availability: Published in Journal of Chemical Physics v46 n3 p1213-4 Feb 1, 1967.

Descriptors: (*Differential equations, Functions), (*Power series, Convergence), Boundary value problems, Mathematics.
Identifiers: Thomas-Fermi function.

The Thomas-Fermi function, that is, the solution of the Thomas-Fermi equation (1) the second derivative of phi (x) with respect to x = (phi (x) to the 3/2 power)/the square root of x, subject to the boundary conditions phi (0)=1 and phi (infinity)-0, can be expanded about the origin in a semiconvergent power series (2) phi (x) = Summation, n=0 to n=infinity, of a (subscript n) x (to the power n/2). The first 18 of the coefficients a (subscript n) have been previously calculated and are given explicitly in terms of the initial slope a (subcript n). It is our purpose here to study the coefficients in general.
AD-656 220 Not available from CFSTI.

A LOWER BOUND FOR THE DELTA-NIELSEN NUMBER,
Rand Corp Santa Monica Calif
Robin B. S. Brooks, and Robert F. Brown. Jul 67, 20p Rept no. P-3634
Prepared in cooperation with California Univ., Los Angeles, under Grant NSF-GP-4018.

Descriptors: (*Mapping (Transformations), *Equations), Theorems, Mathematics.
Identifiers: Delta-Nielsen number, Hausdorff space.

This paper is concerned with the number of solutions of three kinds of equations. Let f,g : X approaches Y and h : X approaches X be maps, and let y sub 0 be a member of Y. The equations we will study are (1) f (x) = g (x), (2) f (x) = y sub 0, and (3) h (x) = x. In a previous paper, the first author defined a lower bound N for the number of solutions of these equations which remains such a lower bound when f,g, and h are moved through homotopies. The number N is called the Delta-Nielsen number of the equation.
AD-656 306 HC$3.00 MF$0.65

QUALITY - A COMBINATION OF HORSESENSE AND STATISTICAL METHODS,
Rome Cable Corp N Y
For primary bibliographic entry see Field 13H.
AD-656 333 HC$3.00 MF$0.65

EFFECTIVENESS OF INFORMATION RETRIEVAL METHODS,
Bolt Beranek and Newman Inc Cambridge Mass
For primary bibliographic entry see Field 5B.
AD-656 340 HC$3.00 MF$0.65

THE LAMBDA METHOD FOR BOUNDARY VALUE PROBLEMS.
University Coll Cork (Ireland) Dept of Mathematical Physics
For primary bibliographic entry see Field 20K.
AD-656 391 HC$3.00 MF$0.65

THE SEPARATE COMPUTATION OF ARCS FOR OPTIMAL FLIGHT PATHS WITH STATE VARIABLE INEQUALITY CONSTRAINTS.
Technical rept.,
Harvard Univ Cambridge Mass Div of Engineering and Applied Physics
Jason L. Speyer, Raman K. Mehra, and Arthur E. Bryson, Jr. May 67, 33p Rept no. TR-526
Contract Nonr-1866 (16), Grant NGR-22-007-068

Descriptors: (*Flight paths, *Optimization), (*Gliders, Ranges (Distance)), (*Atmosphere entry, Gliders), Reentry vehicles, Descent trajectories, Numerical analysis, Equations of motion.
Identifiers: State variable inequality constraint.

Separate computation of arcs is possible for a large class of optimization problems with state variable inequality constraints. Surprisingly, this class (to the best of the authors' knowledge) includes all physical problems which have been solved analytically or numerically to date. Typically these problems have only one constrained arc. Even in more complex problems, separation of arcs can be used to search for additional constrained arcs. As an important example, a maximum range trajectory for a glider entering the Earth's atmosphere at a supercircular velocity is determined, subject to a maximum altitude constraint after initial pull-up. It is shown that the optimal path can be divided into three arcs, which may be determined separately with no approximations. The three arcs are (1) the initial arc, beginning at specified initial condition and ending at the entry point onto the altitude constraint; (2) the arc lying on the altitude constraint; and (3) the terminal arc, beginning at the exit point of the altitude constraint and ending at some specified terminal altitude. The conjugate gradient method, a first order optimization scheme is shown to converge very rapidly to the individual unconstrained optimal arcs. Using this optimization scheme and taking advantage of the separation of arcs an investigation revealed that two locally optimum paths exist. The range of one exceeds the range of the other by about 250 nautical miles (about 6%) for the re-entry vehicle used here (maximum lift-to-drag ratio is .9). (Author)
AD-656 394 HC$3.00 MF$0.65

ESTIMATION USING SAMPLED-DATA CONTAINING SEQUENTIALLY CORRELATED NOISE.
Technical rept.,
Harvard Univ Cambridge Mass Div of Engineering and Applied Physics
A. E. Bryson, Jr., and L. J. Henrikson. Jun 67, 19p Rept no. TR-533
Contract Nonr-1866 (16), Grant NR-22-007-068

Descriptors: (*Linear systems, Dynamics), (*Measurement, Numerical analysis), Sequences, Noise, Predictions, Mathematics.
Identifiers: Maximum likelihood, Estimation theory, Filter (Mathematics).

The paper presents improved filtering, prediction, and smoothing procedures for multi-stage linear dynamic systems when the measured quantities are linear combinations of the state variables with additive sequentially correlated noise. The 'augmented state' procedure suggested by Kalman may lead to ill-conditioned computations in constructing the data processing filter. The design procedure described here eliminates these ill-conditioned computations and reduces the dimension of the filter required. The results include explicit relations for prediction, filtering, and smoothing procedures and the associated covariance matrices. (Author)
AD-656 396 HC$3.00 MF$0.65

NON-STANDARD ANALYSIS WITHOUT TEARS: AN EASY INTRODUCTION TO A. ROBINSON'S THEORY OF INFINITESIMALS.
Technical rept.,
Hebrew Univ Jerusalem (Israel)
Moshe Machover. May 67, 61p Rept no. TR-27
Contract F61052-67-C0055

Descriptors: (*Topology, *Set theory), Mathematical logic, Mapping (Transformations), Mathematics, Theorems.
Identifiers: Non-standard analysis.

A simplified framework is given for A. Robinson's non-standard analysis, using a small fragment of set theory rather than type theory. Various topics in topology are discussed in the light of Robinson's theory. (Author)
AD-656 401 HC$3.00 MF$0.65

CYCLES WITH MINIMUM AVERAGE LENGTH.
California Univ Berkeley Operations Research Center
For primary bibliographic entry see Field 12B.
AD-656 471 HC$3.00 MF$0.65

TWO QUEUES IN SERIES WITH A FINITE INTERMEDIATE WAITINGROOM,
Purdue Univ Lafayette Ind Dept of Statistics
Marcel F. Neuts. Jun 67, 35p Rept no. Mimeograph Ser-110
Contract Nonr-1100 (26)

Descriptors: (*Queueing theory, Statistical processes), Mathematical models, Random variables, Distribution theory, Sequences, Probability, Theorems.

A service unit I, with Poisson input and general service times is in series with a unit II, with negative-exponential service times. The intermediate waitingroom can accomodate at most k persons and a customer cannot leave unit I when the waitingroom is full. The paper shows that this system of queues can be studied in terms of an imbedded semi-Markov process. Equations for the time dependent distributions are given, but the main emphasis of the paper is on the equilibrium conditions and on asymptotic results. (Author)
AD-656 483 HC$3.00 MF$0.65

CONTROLLING A LETHAL GROWTH PROCESS,
Purdue Univ Lafayette Ind Dept of Statistics
For primary bibliographic entry see Field 6P.
AD-656 484 HC$3.00 MF$0.65

SOME RESULTS ON ALMOST SURE AND COMPLETE CONVERGENCE IN THE INDEPENDENT AND MARTINGALE CASES,
Purdue Univ Lafayette Ind Dept of Statistics
William Fleming Stout. Aug 67, 72p Rept no. Mimeograph Ser-113
Contract Nonr-1100 (26)

Descriptors: (*Statistical analysis, Random variables), (*Sequences, Convergence), Probability, Matrix algebra, Series, Theorems, Inequalities.

Let (Omega,F,P) be a probability space, (D (subscript n), n = or > 1) be a sequence of independent random variables, a (subscript nk) be a matrix of real numbers, T (subscript nm) = Summation, k=1 to k=m, of a (subscript nk) D (subscript k), and T (subscript n) be the almost sure limit as m approaches infinity when it exists. T (subscript n) is said to converge completely to zero (15) if Summation, n=1 to n=infinity, of p ((absolute value of T subscript n) > epsilon) < infinity for all epsilon > o. Various conditions are given for the complete or almost sure convergence of T (subscript n) to zero, extending or improving results given by others. In Chapter II, we extend to the martingale case a result of Chow concerning the complete convergence of T (subscript n) to zero where the D sub n's are generalized Gaussian. In Chapter III a number of almost sure convergence results are established in the martingale case. Chapter IV an extension of the Kolmogorov law of the iterated logarithm to the martingale case is made.
AD-656 485 HC$3.00 MF$0.65

DISCRETE FINITE FOURIER TRANSFORMS: A TUTORIAL APPROACH.
Interim rept.,
Naval Research Lab Washington D C
D. A. Swick. 29 Jun 67, 23p Rept no. NRL-6557

Descriptors: (*Integral transforms, *Time series analysis), Analysis, Exponential functions, Operators (Mathematics), Mathematics, Sampling, Signals.

A discrete, finite time series of N points f sub n n = 0, 1, 2,..., N - 1, often arises, for example, in the sampling of continuous data. This time series can be expressed as the finite series f sub n = Summation, k = 0 to k = N - 1, of (F sub k e to the power (2 pi i k n/N)), n = 0, 1, 2,..., N - 1, where the coefficients F sub k, to be interpreted as frequency values, are given by F sub k = 1/N Summation, n = 0 to n = N - 1, of (f sub n e to the power (-2 pi i k n/N)), k = 0, 1, 2,..., N - 1. Experimental errors inherent in f sub n will, of course, be reflected in F sub k. Given the original time series f sub n, however, it is exactly (i.e., without approximation) represented by F sub k at the N points of interest. These formulas are derived from basic principles, and their relationship to digital analysis of data sampled from continuous signals is discussed. In particular, the efficient use of the recently popular algorithms for rapid machine computation of Fourier transforms is explained. Although the results obtained are for the most part well known in the literature, it is felt that the importance of these transforms warrants a complete and notationally consistent exposition. (Author)
AD-656 577 HC$3.00 MF$0.65

NORMIX: COMPUTATIONAL METHODS FOR ESTIMATING THE PARAMETERS OF MUL-

TIVARIATE NORMAL MIXTURES OF DISTRIBUTIONS.
Research memo.,
Naval Personnel Research Activity San Diego Calif
John H. Wolfe. Aug 67, 38p Rept no. NPRA-SSRM-68-2

Descriptors: (*Distribution theory, Multivariate analysis), Approximation (Mathematics), Iterative methods, Simultaneous equations, Sampling, Statistical analysis, Computer programs, Pattern recognition.
Identifiers: Maximum likelihood.

Procedures are described for estimating the means, covariances, and mixing proportions of a mixture of multivariate-normal distributions. First, it is shown that the maximum-likelihood estimates must satisfy a certain set of simultaneous equations. The coefficients necessary for a complete Newton-Raphson iterative solution of the equations are presented. Since these coefficients are rather complicated, a simpler and more intuitively-appealing iterative method is presented and partially justified on the basis that the two iterative methods are approximately the same when the component distributions are well-separated. The formulas for the simplified iteration involve the familiar statistics of sums and sums of squares and cross-products with the modification that each sample value is weighted by its relative likelihood of membership in the type whose parameters are being estimated. Since the estimation procedure is basically maximum-likelihood, tests of hypotheses on the number of component distributions can be developed using likelihood ratios. The computational feasibility of the iteration methods is demonstrated in an example in which a computer program to perform the iterations was run on an artificially-constructed mixture of three bivariate normal distributions. A discussion of potential applications indicates that the method has promise in the fields of personality typology, social class analysis, biological taxonomy, information retrieval and artificial intelligence.
AD-656 588 HC$3.00 MF$0.65

GENERAL SOLUTION FOR THE ECONOMIC DESIGN OF X-CHARTS BASED ON DUNCAN'S MODEL.
Wisconsin Univ Madison Dept of Statistics
For primary bibliographic entry see Field 12B.
AD-656 596 HC$3.00 MF$0.65

GEOMETRIC DIFFERENTIAL EQUATIONS: RECENT PAST AND PROXIMATE FUTURE,
Brown Univ Providence R I Center for Dynamical Systems
Solomon Lefschetz. 1967, 17p
AROD-5145:8
Contracts DA-31-124-ARO (D)-270, NAS8-11264
Prepared in cooperation with Princeton Univ., N. J., and Ciudad Universitaria, N. Mex.
Availability: Published in Differential Equations and Dynamical Systems 14p 1967.

Descriptors: (*Differential equations, *Differential geometry), Reviews, Polynomials, Vector spaces, Theorems, Stability, Matrix algebra, Dynamics, Control.
Identifiers: Euclidean space, Geometric differential equations, Lyapunov theorem.

The author discusses the history of geometric differential equations, particularly the contributions of Henri Poincare, Ivar Bendixson, Cartwright-Littlewood, Levinson-Smith, Berkhoff, and Andronov and Pontriagin. (Author)
AD-656 641 Not available from CFSTI.

AN INVARIANCE PRINCIPLE IN THE THEORY OF STABILITY,
Brown Univ Providence R I Center for Dynamical Systems
Joseph P. LaSalle. 1967, 13p
AROD-5145:11
Contract DA-31-124-ARO (D)-270, Grant AF-AFOSR-693-65
Research supported in part by NASA.
Availability: Published in Differential Equations and Dynamical Systems p277-86 1966.

Descriptors: (*Stability, *Invariance), (*Differential equations, Dynamics), Partial differential equations, Theorems, Periodic variations, Mathematics.
Identifiers: Lyapunov functions, Lyapunov theorem.

The purpose of this paper is to give a unified presentation of Liapunov's theory of stability that includes the classical Liapunov theorems on stability and instability as well as their more recent extensions. The idea being exploited here had its beginnings some time ago. It was, however, the use made of this idea by Yoshizawa in his study of nonautonomous differential equations and by Hale in his study of autonomous functional-differential equations that caused the author to return to this subject and to adopt the general approach and point of view of this paper. This produces some new results for dynamical systems defined by ordinary differential equations which demonstrate the essential nature of a Liapunov function and which may be useful in applications. Of greater importance, however, is the possibility, as already indicated by Hale's results for functional-differential equations, that these ideas can be extended to more general classes of dynamical systems. It is hoped, for instance, that it may be possible to do this for some special types of dynamical systems defined by partial differential equations. In Section 2 we present some basic results for ordinary differential equations. Section 3 is devoted to a brief discussion of some of Hale's recent results for autonomous functional-differential equations.
AD-656 642 Not available from CFSTI.

A NOTE ON PERIODIC SOLUTIONS OF NONLINEAR DIFFERENTIAL EQUATIONS WITH TIME LAGS,
Brown Univ Providence R I Center for Dynamical Systems
Carlos Perello. 1967, 6p
AROD-5145:7
Contract DA-31-124-ARO (D)-270, Grant NSF-GP-4632
Availability: Published in Differential Equations and Dynamical Systems p185-7 1967.

Descriptors: (*Nonlinear differential equations, Periodic variations), Difference equations, Inequalities, Operators (Mathematics), Mapping (Transformations), Approximation (Mathematics).
Identifiers: Euclidean space.

It is shown that the methods of Cesari and Knobloch can be used almost without modification to determine the existence of periodic solutions of nonlinear differential equations with time lag. (Author)
AD-656 643 Not available from CFSTI.

CONTRIBUTIONS TO DOEBLIN'S THEORY OF MARKOV PROCESSES,
Minnesota Univ Minneapolis Dept of Mathematics
Naresh Jain, and Benton Jamison. 25 Nov 66, 24p
AFOSR-67-1858
Grant AF-AFOSR-381-66
Availability: Published in Journal of Probability Theory v8 p41-8 1967.

Descriptors: (*Statistical processes, Theorems), Probability, Measure theory, Stochastic processes, Set theory, Inequalities, Mathematics.
Identifiers: Limit theorem.

A Markov process on an absolutely essential and indecomposable state space (X,B) is (a) normal if B is separable, (b) normal if and only if there is a stochastically closed set N which is recurrent in the sense of Harris. Known results for processes recurrent in the sense of Harris are used to sharpen Doeblin's limit theorems and to simplify their proofs. (Author)
AD-656 657 Not available from CFSTI.

HILBERT-SPACE METHODS IN ELLIPTIC PARTIAL DIFFERENTIAL EQUATIONS,
California Univ Los Angeles
Edward M. Landesman. 15 Oct 65, 23p
AROD-5863:9
Contract DA-31-124-ARO (D)-355
Prepared in cooperation with California Univ., Santa Cruz.
Availability: Published in Pacific Journal of Mathematics v21 n1 p113-31 1967.

Descriptors: (*Partial differential equations, *Hilbert space), Operators (Mathematics), Mapping (Transformations), Transformations (Mathematics), Inequalities, Convergence, Functions, Theorems.
Identifiers: Existence theorems, Eigenfunctions.

The purpose of this paper is to study, together with applications, those aspects of the theory of Hilbert Space which are pertinent to the theory of elliptic partial differential equations. This involves the study of an unbounded operator A from one Hilbert Space to another together with its adjoint A*, its pseudo-inverse or generalized reciprocal A (superscript-1), and its *-reciprocal A' = A (superscript *-1). In order to carry out the results, further properties of the operators A (superscript-1) and A' are developed in this paper.
AD-656 665 Not available from CFSTI.

SOLVING LINEAR PROGRAMS IN INTEGERS.
Revised ed.,
Rand Corp Santa Monica Calif
George B. Dantzig. 11 Jul 58, 6p Rept no. P-1359
Revision of manuscript submitted 15 May 58.
Availability: Published in Copyrighted Journal.

Descriptors: (*Linear programming, Iterative methods), Inequalities, Theorems, Convergence, Mathematics.

A recent result of Gomory (Princeton) settled an outstanding problem, namely that of solving linear programs in integers. Gomory showed how to add linear inequality constraints to a linear programming problem automatically in such a way that the extreme points of the resulting convex contain only integral solutions in the neighborhood of the minimum. In the present research memorandum, an alternative method is given for generating additional constraints in a way easy to justify and to apply. However, it is not known whether these conditions will lead to a solution in a finite number of iterations as is true for the stronger Gomory conditions. Anyone considering their practical use should therefore weigh the ease of generation against the extra number of iterations required for convergence. (Author)
AD-656 682 Not available from CFSTI.

OPTIMAL CONTROL WHEN THE VARIANCE OF THE MANIPULATED VARIABLE IS CONSTRAINED.
Technical rept.,
Wisconsin Univ Madison Dept of Statistics
G. E. P. Box, and G. M. Jenkins. Mar 67, 26p
Rept no. TR-108
Grant AF-AFOSR-1158-66

Descriptors: (*Control, Optimization), (*Dynamics, *Mathematical models), Random variables, Correlation techniques, Errors, Difference equations, Mathematical analysis, Tables.
Identifiers: Optimal control theory.

Discrete feedback control schemes discussed by Box and Jenkins were designed to produce minimum mean square error in the output. It was tacitly supposed that there was no restriction in the degree of manipulation that could be applied to x sub t the input or manipulated variable to achieve this. It sometimes happens that we are not able to employ these optimal schemes because the amount of variation which can be allowed in the input adjustments x sub t is restricted by practical limitations. It is considered, therefore, how the previous control schemes would need to be modified if a constraint was placed on V (x sub t) the variance in the input. Such modified schemes are of considerable practical importance because unrestricted schemes can call for excessively large values of V (x sub t).
AD-656 683 HC$3.00 MF$0.65

MODELS FOR PREDICTION AND CONTROL IX DYNAMIC MODELS.
Technical rept.,
Wisconsin Univ Madison Dept of Statistics
G. E. P. Box, and G. M. Jenkins. May 67, 32p
Rept no. TR-116
Grant AF-AFOSR-1158-66

Descriptors: (*Control systems, Mathematical models), (*Mathematical models, Dynamics), (*Dynamics, Difference equations), Time series analysis, Linear systems, Differential equations, Sampling, Response, Operators (Mathematics), Exponential functions.

In previous chapters we have considered the problem of representing practically occurring time series by linear stochastic difference equations. As a first example of the use of such models we have shown how they may be used for forecasting both non-seasonal and seasonal series. These series may also be used to represent disturbances such as arise in economics, engineering and in business applications. To control such systems we need not only an adequate disturbance model, but also a dynamic model which can take account of the various types of inertia which may be inherent in the process. The present chapter provides an introduction to models based on difference equations which give a parsimonious mathematical representation of the dynamic behaviour of physical systems. Two cases will be distinguished: (1) When the input to the system is kept fixed over constant intervals of time as in the discrete control systems, and, (2) When an essentially continuous input and output are sampled at equidistant time intervals and the resulting discrete time series used to estimate the dynamic response or transfer function of the system.
AD-656 684 HC$3.00 MF$0.65

MODELS FOR FORECASTING SEASONAL AND NON-SEASONAL TIME SERIES.
Technical rept.,
Wisconsin Univ Madison Dept of Statistics
George E. P. Box, Gwilym M. Jenkins, and D. W. Bacon. Jun 67, 43p Rept no. TR-118
Grant AF-AFOSR-1158-66

Descriptors: (*Time series analysis, Stochastic processes), (*Statistical analysis, Time series analysis), Mathematical models, Operators (Mathematics), Transformations (Mathematics), Iterative methods, Control, Mathematical analysis.
Identifiers: Autocorrelation functions.

The optimal forecasts of future values of a time series are determined by the nature of the stochastic model which describes that series. The main effort then in statistical analysis directed to forecasting must be in obtaining a suitable stochastic model for the series. The following paper outlines the approach which has been taken in a forthcoming book. Box, G. E. P. and Jenkins, G. M., Statistical Models for Forecasting and Control, Holden-Day, San Francisco.
AD-656 685 HC$3.00 MF$0.65

OPTIMAL CONTROL OF A DISCRETE-TIME STOCHASTIC SYSTEM LINEAR IN THE STATE,
Rand Corp Santa Monica Calif
Joseph L. Midler. Aug 67, 10p Rept no. P-3631
Presented at the International Symposium on Mathematical Programming, (6th), Princeton Univ., N. J., August 14-18, 1967.

Descriptors: (*Decision theory, Stochastic processes), (*Control, Optimization), (*Stochastic processes, Control systems), Random variables, Mathematical programming, Dynamics, Mathematical models, Mapping (Transformations), Dynamic programming, Algorithms.
Identifiers: Optimal control theory.

Considered is a discrete-time stochastic control problem whose dynamic equations and loss function are linear in the state vector with random coefficients, but which may vary in a nonlinear, random manner with the control variables. The controls are constrained to lie in a given set. For this system it is shown that the optimal control or policy is independent of the value of the state. The result follows from a simple dynamic programming argument. Under suitable restrictions on the functions, the dynamic programming approach leads to efficient computational methods for obtaining the controls via a sequence of mathematical programming problems in fewer variables than the number of controls in the entire process. The result provides another instance of certainty equivalence for a sequential stochastic decision problem. The expectations of the random variables play the role of certainty equivalents in the sense that the optimal control can be found by solving a deterministic problem in which expectations replace the random quantities.
AD-656 696 HC$3.00 MF$0.65

COLLECTED RESULTS ON NUMERICAL RESEARCH,
Aerospace Corp El Segundo Calif Technical Operations
Thomas R. Parkin, and Leon J. Lander. Apr 67, 94p Rept no. TR-1001 (9990)-2
SSD-TR-67-115
Contract AF 04 (695)-1001

Descriptors: (*Number theory, Computers), Mathematics, Numbers, Prime numbers, Algorithms, Series, Equations, Tables.
Identifiers: Diophantine equation.

A compilation of results from research in number theory involving the use of a digital computer is presented. The research is related to characteristics of prime numbers, equal sums of powers of integers, differences of powers of integers, equal sums of fifth powers, and the classic problem of finding two equal sums of two biquadrates. (Author)
AD-656 704 HC$3.00 MF$0.65

HANDLING OF LAURENT SERIES ON A COMPUTER.
Technical memo.,
Naval Weapons Lab Dahlgren Va
Hartmut G. M. Huber. Jun 67, 34p Rept no. NWL-TM-K-41/67

Descriptors: (*Series, *Complex variables), (*Computer programs, Series), Taylor's series, Functions, Mapping (Transformations), Operators (Mathematics), Differential equations, Subroutines, Mathematical analysis, Algorithms.
Identifiers: FORMAC.

The first part of this report is devoted to a treatment of Laurent series as symbolic entities. The concept of an explicitly computable function having functions as arguments and values is introduced. It is shown that most operations with Laurent series as operands and values are not explicitly computable. The second part deals with truncated Laurent series. An implementation of a system of subroutines in FORMAC handling truncated Laurent series is described. A short version of this paper was presented at the meeting of the SHARE Symbolic Mathematical Computation Working Committee, Dayton, Ohio, on 1-2 Dec 1966. (Author)
AD-656 729 HC$3.00 MF$0.65

APPLICATION OF QUASILINEARIZATION TO THE SOLUTION OF NON-LINEAR DIFFERENTIAL EQUATIONS.
Special rept.,
Kansas State Univ Manhattan
E. S. Lee, S. S. Chen, L. T. Fan, and C. L. Hwang. 10 Mar 67, 34p Rept no. SR-78
AFOSR-67-1865
Grant AF-AFOSR-463-66

Descriptors: (*Nonlinear differential equations, *Boundary value problems), Taylor's series, Iterative methods, Convergence, Accuracy, Numerical analysis, Linear systems, Fluid flow.
Identifiers: Quasilinearization.

This report introduces the reader to the use of the quasilinearization technique which was developed by Bellman and Kalaba and applied extensively to chemical engineering problems by Lee in obtaining numerical solutions of certain classes of nonlinear ordinary differential equations of the boundary value type encountered in chemical engineering, optimization, the boundary layer theory, and in control problems. The nonlinear differential equation is first represented by a set of simultaneous first order differential equations. Each of the first order nonlinear differential equations is linearized using the Taylor series expansion with second and higher order terms omitted. Iterative solution of the resulting linear differential equations usually converges quadratically to the solution of the original equation. This means that each iteration approximately doubles the number of digits of accuracy. A simple problem of steady flow in the boundary layer along a cylinder near the forward stagnation point is solved to illustrate the use of the technique.
AD-656 782 HC$3.00 MF$0.65

ERROR BOUNDS ON NUMERICAL SOLUTIONS OF DIRICHLET PROBLEMS FOR QUASILINEAR ELLIPTIC EQUATIONS,
Los Alamos Scientific Lab., N. Mex.
Thurman G. Frank. Aug 66, 150p
Contract W-7405-eng-36

Descriptors: (*Difference equations, *Boundary value problems), (*Partial differential equations, Errors), Operators (Mathematics).

For abstract, see NSA 21 15.
LA-3685 HC$3.00 MF$0.65

THE PHYSICAL TENSOR AND APPLICATION FINAL SCIENTIFIC REPORT, 1 NOV. 1965 - 31 JAN. 1967.
Israel Inst. of Tech., Haifa. Dept. of Mechanics.
Z. Karni. 28 Feb 67, 57p TDM-67-6, AFOSR-67-1161
Contract AF-EOAR-66-19

Descriptors: *Differential equation, *Field theory, *Matrix algebra, *Tensor analysis, Algebra, Analysis, Bilinear, Continuum, Differential, Electric, Energy, Equation, Field, Flux, Integral, Invariance, Mass, Matrix, Mechanics, Momentum, Motion, Multilinear, Permutation, Tensor, Theorem, Theory.

For abstract, see STAR 05 18.
N67-31638 HC$3.00 MF$0.65

RANKING PROBLEMS IN MULTIVARIATE NORMAL (STATISTICAL) POPULATIONS FINAL REPORT, 1 JUL. 1966 - 30 JUN. 1967.
Ohio State Univ. Research Foundation, Columbus.
M. H. Rizvi. 6 Jul 67, 3p NASA-CR-85594, REPT.-2
Contract NGR-36-008-040

Descriptors: *Mathematical statistics, *Probability distribution, *Quadrature approximation, *Statistical analysis, Analysis, Approximation, Density, Difference, Differential, Distribution, Equation, Function, Integral, Mathematics, Normal, Population, Probability, Quadrature, Statistics, Theory.

For abstract, see STAR 05 18.
N67-31744 HC$3.00 MF$0.65

COVERED SPACES.
Kent State Univ., Ohio. Dept. of Mathematics.
J. E. Edelman. Aug 67, 31p NASA-CR-86920, TR-26
Grant NSG-568

Descriptors: *Graph, *Topology, Closure, Function, Homomorphism, Map, Property, Set, Space.

For abstract, see STAR 05 18.
N67-32149 HC$3.00 MF$0.65

CONVERGENCE ACCELERATION FOR LEAST SQUARES DIFFERENTIAL CORRECTIONS.
Analytical Mechanics Associates, Inc., Uniondale, N. Y.
S. Pines, and H. Wolf. 1967, 6p NASA-CR-86997
Contract NAS5-2535

Descriptors: *Acceleration, *Convergence, *Least squares method, Correction, Differential, Equation, Iteration, Least, Method, Nonlinear, Sequence, Square.

For abstract, see STAR 05 18.
N67-32312 HC$3.00 MF$0.65

ON A CLASS OF WAVE EQUATIONS.
Technische Hogeschool, Eindhoven (Netherlands).
L. A. Peletier. 16 May 67, 104p

Descriptors: *Boundary value problem, *Cauchy problem, *Problem solving, *Stability, *Wave equation, Bibliography, Boundary, Conservation, Differential, Dispersion, Equation, First, Harmonic, Hyperbola, Initial, Law, Linear, Mathematics, Method, Mixing, Mode, Normal, Order, Partial, Physics, Problem, Solution, Value, Wave.

For abstract, see STAR 05 18.
N67-32471 HC$3.00 MF$0.65

ON THE STABILITY OF SOME LINEAR NONAUTONOMOUS SYSTEMS.
Brown Univ., Providence, R. I. Center for Dynamical Systems.
E. F. Infante. 1967, 27p NASA-CR-86555
Contracts NAS8-11264, NGR-40-002-015

Descriptors: *Differential equation, *Linear system, *Time function, Coefficient, Differential, Equation, Function, Linear, Norm, Quadratic, Stability, System, Theorem, Time, Variation.

For abstract, see STAR 05 18.
N67-32635 HC$3.00 MF$0.65

PUBLISHABLE GRAPHS BY COMPUTER A FLEXIBLE, EASY-TO-USE PROGRAM FOR THE CALCOMP PLOTTER,
California Univ., Livermore. Lawrence Radiation Lab.
J. R. Terrall. 15 Apr 67, 32p
Contract W-7405-eng-48

Descriptors: (*Graphics, Computer programs), (*Programming languages, Punched cards).

For abstract, see NSA 21 15.
UCRL-50250 HC$3.00 MF$0.65

12B. Operations Research

ESTIMATING FROM MISCLASSIFIED DATA,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5A.
AD-655 845 HC$3.00 MF$0.65

ALTERNATIVE SCHEMES FOR INVESTIGATING MARKOV DECISION PROCESSES.
Technical rept.,
Massachusetts Inst of Tech Cambridge Operations Research Center
Amedeo R. Odoni. Jun 67, 74p Rept no. TR-28
Contracts DA-31-124-ARO (D)-209, Nonr-3963 (06)

Descriptors: (*Decision theory, *Statistical processes), Algorithms, Iterative methods, Optimization, Efficiency, Dynamic programming, Mathematical models, Theses.

The report is concerned with the problem of finding optimal policies for infinite-horizon Markovian decision models. Several algorithms applicable to discrete time, discrete state, single-chain Markov processes with undiscounted rewards are described. One of these algorithms, called 'the iterative method with limits,' is proved and its properties are discussed. The method consists of finding upper and lower limits for the optimal gain per transition of the infinite-horizon process. These limits improve on each iteration of the algorithm, and converge to the final value of the optimal gain, ultimately. Simultaneously, the algorithm produces the 'relative value' variables, as well as the optimal policy. The computational efficiency of the aforementioned algorithms was compared by solving several test problems. It was found that for problems for which the number of alternatives per state is considerably less than the number of states, the iterative method with limits enjoys a serious speed advantage over the well-known policy iteration algorithms. The former method also produces very accurate results with very little programming effort. (Author)
AD-655 893 HC$3.00 MF$0.65

LINEAR DISCRETE OPTIMAL SYSTEMS WITH SIDE CONSTRAINTS,
South Carolina Univ Columbia Dept of Electrical Engineering
For primary bibliographic entry see Field 5A.
AD-656 022 Not available from CFSTI.

THE DELIVERY PROBLEM.
Research rept.,
Carnegie Inst of Tech Pittsburgh Pa Management Sciences Research Group
Robert L. Hayes. Jul 67, 90p Rept no. RR-106
Contract Nonr-760 (24)

Descriptors: (*Scheduling, Cargo vehicles), Management planning, Optimization, Mathematical programming, Algorithms.

In the delivery problem we are required to find a minimum distance (cost) system of routes for a fleet of delivery vehicles. As inputs we are given the inter-customer travel times and the quantity of product which must be supplied to each customer. In this paper we review the various formulations which have been proposed for solving the problem and present two new approaches. The first is a branch and bound algorithm which, because of its rapid increase in computation time with an increase in problem size, can optimally solve problems having at most fifteen to twenty customers. The second formulation is a heuristic programming approach which is capable of solving much larger problems, but does not guarantee an optimal solution. The paper concludes with a chapter suggesting how these two methods might be modified so as to solve many of the common variations of the basic problem. (Author)
AD-656 030 HC$3.00 MF$0.65

BAYESIAN ANALYSIS OF SYSTEM READINESS.
Carnegie Inst of Tech Pittsburgh Pa Management Sciences Research Group
For primary bibliographic entry see Field 14D.
AD-656 031 HC$3.00 MF$0.65

L-SHAPED LINEAR PROGRAMS WITH APPLICATIONS TO OPTIMAL CONTROL AND STOCHASTIC PROGRAMMING.
Research rept.,
California Univ Berkeley Operations Research Center
R. M. Van Slyke, and Roger J.-B. Wets. Jun 67, 47p Rept no. ORC-66-17-Rev.
Contract Nonr-222 (83), Grant NSF-GP-4593

Descriptors: (*Mathematical programming, *Operations research), (*Linear programming, *Stochastic processes), (*Optimization, *Control), Algorithms, Problem solving, Approximation (Mathematics), Feasibility studies, Costs.

The paper gives an algorithm for L-shaped linear programs which arise naturally in optimal control problems with state constraints and stochastic linear programs (which can be represented in this form with an infinite number of linear constraints). The first section describes a cutting hyperplane algorithm which is shown to be equivalent to a partial decomposition algorithm of the dual program. The two last sections are devoted to applications of the cutting hyperplane algorithm to a linear optimal control problem and stochastic programming problems. (Author)
AD-656 045 HC$3.00 MF$0.65

REPAIR VERSUS REPLACEMENT, A STUDY OF EQUIPMENT MAINTENANCE.
Pacific Missile Range Point Mugu Calif
For primary bibliographic entry see Field 15E.
AD-656 435 HC$3.00 MF$0.65

MINIMAX CONTROLLER DESIGN,
Illinois Univ Urbana Coordinated Science Lab
David M. Salmon. Jul 67, 113p Rept no. R-358
Contract DA-28-043-AMC-00073 (E), Grant AF-AFOSR-931-66

Descriptors: (*Operations research, *Minimax technique), (*Optimization, Control), Algorithms, Design, Sensitivity, Performance (Engineering), Systems engineering, Theses, Convergence.

When an uncertain dynamic system is to be controlled in an optimal manner, that is when the controller is required to minimize a performance index, the controller design requires a compromise between controller complexity and system performance. At one extreme is the optimal-adaptive controller which is difficult to realize but yields ideal performance, and at the other is any overly simplified controller which yields unacceptable performance. The reasonable controller structures for a given system can often be determined by the designer in terms of a number of free parameters. Then for each structure it is desired to find those parameters which yield the 'best' system performance. This thesis develops minimax methods for determining such controller parameters. The concept of performance-sensitivity is introduced to

meet the usual criticism of minimax or 'worst-case' design, that it is too pessimistic in concentrating all attention on the worst parameters. Properties of minimax control with a performance-sensitivity as the index are developed. It is shown that the usually desired range of system properties can be achieved by minimaximizing either the system performance index or a performance-sensitivity. A new algorithm for solving algebraic minimax problems, regardless of the presence of a saddle point, is presented and proved to converge. The rate of convergence, and simplifications which occur when the system is linear or when the index has convexity properties, are discussed. (Author)
AD-656 450 HC$3.00 MF$0.65

A CLASS OF MODELS FOR ADAPTIVE EXPERIMENTATION AND CONTROL.
Technical rept.,
Massachusetts Inst of Tech Cambridge Operations Research Center
Ernest Gerald Hurst, Jr. Jul 67, 136p Rept no. TR-30
Contract Nonr-1841 (87)

Descriptors: (*Adaptive systems, Control), (*Stochastic processes, Decision theory), (*Operations research, Mathematical models), Theses, Time series analysis, Sampling, Multivariate analysis, Probability density functions, Dynamic programming, Inventory control, Management planning, Costs.

Solutions are presented for several control problems with discretely dynamic, stochastic, partially observable states in which the amount of experimentation at each stage constitutes an important control decision. Bayesian autoregressive time series models are given, both in general and assuming Normal density functions for the change process, data generator, and statistical description of the state. A general dynamic programming formulation for control of the known first-order process is obtained; it is specialized to the case with quadratic cost of error and proportional cost of experimentation. The optimal experimental policy at every stage is found. The form of and numerical values for the steady state policy are presented. A set-up cost of experimentation is introduced, and a two-level experimental policy analogous to the (s,S) policy in inventory theory is obtained. The assumption of completely known process parameters is relaxed by allowing uncertainty in the precision of change. A three-variable dynamic programming formulation is solved for its optimal experimental policy, which is described by two critical numbers. A simple approximately optimal policy in terms of the earlier numerical results is proposed. (Author)
AD-656 470 HC$3.00 MF$0.65

CYCLES WITH MINIMUM AVERAGE LENGTH.
Technical rept.,
California Univ Berkeley Operations Research Center
Alain Fillieres. Jun 67, 22p Rept no. ORC-67-21
AROD-5307:24-M
Contract DA-31-124-ARO (D)-331

Descriptors: (*Mapping (Transformations), Graphics), (*Graphics, Algorithms), Periodic variations, Costs, Optimization, Operations research.

Given a directed network whose arcs have lengths unrestricted in sign and which contains at least one cycle, an algorithm to find the minimum average length cycle (length divided by its number of arcs) is described. A direct application of this algorithm solves the problem of finding whether a directed graph contains a cycle with negative length. (Author)
AD-656 471 HC$3.00 MF$0.65

GENERAL SOLUTION FOR THE ECONOMIC DESIGN OF X-CHARTS BASED ON DUNCAN'S MODEL.
Technical rept.,
Wisconsin Univ Madison Dept of Statistics
S. M. Wu, and A. L. Groel. Jun 67, 35p Rept no. TR-119
Contract Nonr-1202 (17)

Descriptors: (*Sampling, Decision theory), (*Economics, Management planning), Costs, Control, Optimization, Numerical analysis, Design, Probability, Approximation (Mathematics).

An exact and relatively simple general solution for the design of X-charts based on Duncan's model is derived in this paper. The general solution consists of an implicit equation in design variables n (sample size) and k (control limit factor) and an explicit equation for h (sampling interval). The use of this general solution not only yields the exact optimum but also provides valuable information so that the sensitivity of the optimum loss-cost (L*) can be evaluated. Loss-cost contours are used to discuss the nature of the loss-cost surface and the effect of the design variables. The effect of two parameters, the delay factor (e), and the average time for an assignable cause to occur (1/lambda), on the optimum design is evaluated. Numerical examples are used for illustrations. (Author)
AD-656 596 HC$3.00 MF$0.65

THE ROLE OF PLAUSIBLE REASONING WITHIN MILITARY INTELLIGENCE: AN APPLICATION OF BAYES THEOREM AS A MODEL FOR PROBLEM SOLVING,
HRB-Singer Inc State College Pa
C. R. Blunt, P. T. Luckie, E. A. Mares, and D. E. Smith. May 67, 115p Rept no. HRB-4015. 11-R-2
Contract N00014-66-C-0230

Descriptors: (*Problem solving, *Military intelligence), (*Theorems, *Probability), (*Mathematical prediction, *Reasoning), Theorems, Mathematical models, Decision making, Probability, Game theory, Operations research, Inequalities.

The military intelligence analyst must cope with uncertainty during his problem-solving efforts. This uncertainty maps directly through the analysis and synthesis processes and affects his confidence in the output. A formal methodology for analysis can reduce some of these unfavorable effects while augmenting the analysis problem solving capabilities. The role of plausible forms of logical reasoning within intelligence analysis is reviewed, followed with the introduction of Bayes Theorem as a model for intelligence analysis. The conjecture is made that Bayes Theorem can also serve as the nucleus of a formal methodology. The application of Bayes Theorem to several types of problems is demonstrated. However, the implementation of such a model as the nucleus of a complete analysis methodology is hindered by several significant problems. Some of the prime hindering aspects are delineated and discussed.
AD-656 597 HC$3.00 MF$0.65

A PRIMAL-DUAL MULTI-COMMODITY FLOW ALGORITHM.
Technical rept.,
California Univ Berkeley Operations Research Center
William S. Jewell. Sep 66, 56p Rept no. ORC-66-24
AROD-5307:25-M
Contract DA-31-124-ARO (D)-331

Descriptors: (*Algorithms, *Operations research), Theses, Theorems, Transportation, Electrical networks, Programming (Computers), Linear programming, Optimization, Topology, Feasibility studies.

The author's 1958 multi-commodity flow algorithm is reproduced, together with historical and technical comments.
AD-656 606 HC$3.00 MF$0.65

AN IMPROVED METHOD OF FINDING ALL LARGEST COMBINABLE CLASSES,
Illinois Univ Urbana Coordinated Science Lab
Gerald J. Lipovski. Aug 67, 28p Rept no. R-362
Contract DA-28-043-AMC-00073 (E)

Descriptors: (*Algorithms, Combinatorial analysis), (*Set theory, Problem solving), Iterative methods, Programming (Computers), Data storage systems, Flow charting, Tables, Errors, Efficiency, Algebras.

Several algorithms, such as a row-column minimization algorithm and an asynchronous machine assignment algorithm, require finding the largest sets of combinable elements from a list of pairwise combinable elements. The paper presents a technique for finding these sets which is generally faster than the one presently in use. Further, the presentation of this technique uncovers an interesting theory about combinability.
AD-656 608 HC$3.00 MF$0.65

SHORTEST ROUTE METHODS FOR FINITE STATE SPACE, DETERMINISTIC DYNAMIC PROGRAMMING PROBLEMS.
Technical rept.,
Massachusetts Inst of Tech Cambridge Operations Research Center
Jeremy F. Shapiro. Jun 67, 76p Rept no. TR-31
AROD-968:46-M
Contract DA-31-124-ARO (D)-209

Descriptors: (*Dynamic programming, *Operations research), (*Management planning, Optimization), Costs, Algorithms, Iterations, Decision making, Convergence, Approximation (Mathematics), Iterative methods.

A general finite state space, deterministic dynamic programming model with either a finite or infinite planning horizon is viewed as a network optimization problem. Optimal strategies for the model are characterized by optimal (minimal discounted or average cost) paths in the network. Shortest route type algorithms are constructed which find optimal paths of infinite length. Shortest route methods are also exploited in reducing the work of backward iteration in finding optimal paths of finite length. More important, however, is the fact that for finite planning horizons of sufficient length, any optimal immediate decision must also be an immediate decision that is optimal when faced with an infinite horizon. Thus, in the sense of selecting an optimal immediate decision, successive approximation of an optimal infinite horizon strategy by optimal finite horizon strategies exhibits finite convergence. Upper bounds on how long a time horizon is sufficiently long for the convergences to occur are developed. In addition, tests are given for detecting when this convergence of the backward iterative procedure has been effected. Finally, results on the form of optimal paths of any length are given. (Author)
AD-656 612 HC$3.00 MF$0.65

FLOWS IN ARBORESCENCES.
Research rept.,
Carnegie Inst of Tech Pittsburgh Pa Management Sciences Research Group
Fred Glover. Jul 67, 61p Rept no. RR-102
Contract Nonr-760 (24)

Descriptors: (*Linear programming, Algorithms), Optimization, Inequalities, Transformations (Mathematics), Set theory, Theorems, Mathematical analysis.
Identifiers: Integer programming.

Efficient algorithms are given for four network flow problems that arise in solving integer programs by truncated enumeration. The first problem is to find a maximum weight (or minimum cost) flow in an arborescence with upper and lower bound capacities on each arc. Each of the remain-

ing three problems is to find a maximum or minimum flow across some arc of the arborescence (respectively, the terminal arc, a source arc, or an intermediate arc), such that the total weight of the flow is not less than a specified value. Theorems are given characterizing the properties of optimal solutions to these problems, providing the basis for the algorithms proposed. Necessary and sufficient feasibility criteria are provided for the first problem, and a theorem is also given characterizing the relation between optimal integer and continuous solutions to the last three problems. A numerical example is solved in the concluding section. (Author)
AD-656 626 HC$3.00 MF$0.65

TRANSIENT FLOWS IN NETWORKS.
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 15E.
AD-656 681 HC$3.00 MF$0.65

PRICE STRATEGY OLIGOPOLY WITH PRODUCT VARIATION,
Yale Univ New Haven Conn Cowles Foundation for Research in Economics
Lloyd Shapley, and Martin Shubik. 25 Jul 67, 21p Rept no. Cowles Discussion Paper-233
Contract Nonr-3055 (01)

Descriptors: (*Game theory, Management planning), (*Costs, Mathematical models), Economics, Optimization, Stability.
Identifiers: Utility functions, Competition, Oligopoly.

This paper mathematically formulates an example of firms in monopolistic competition and investigate noncooperative behavior as the number of firms increases and as the level of product variation is decreased.
AD-656 721 HC$3.00 MF$0.65

ON ADAPTIVE NETS.
Scientific rept. for Jun 65-Apr 67,
Bell Aerosystems Co Buffalo N Y
Frederic D. Powell. 18 Apr 67, 30p Rept no. 9500-920083
Contracts Nonr-4864 (00), AF 49 (638)-1627
Paper presented at Texas Univ. Electrical Engineering Dept. Seminar, Austin, Apr 1967.

Descriptors: (*Adaptive systems, Control), Algorithms, Signals, Optimization, Learning machines, Nonlinear systems, Dynamics, Models (Simulations), Mathematical analysis.

A brief review is given of basic function-modeling and function-inverting features of adaptive nets. Applications are discussed to adaptive matrix inversion, decorrelation, and some of the features that optimize the performance of such nets. Areas of application of the algorithms and networks for optimal deterministic modeling of systems with unknown plants are indicated. (Author)
AD-656 764 HC$3.00 MF$0.65

DESIGNS OF EXPERIMENTS AS TELESCOPING SEQUENCES OF BLOCKS FOR OPTIMUM SEEKING (AS INTENDED FOR ALLOY DEVELOPMENT).
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A. G. Holms. Aug 67, 54p NASA-TN-D-4100
Contract 129-03-01-03-22

Descriptors: *Alloy, *Experiment design, Application, Block, Condition, Design, Development, Experiment, Optimum, Processing, Property, Sequence, Statistical, Technology.

For abstract, see STAR 05 18.
N67-32485 HC$3.00 MF$0.65

13. MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

SHEAR STRENGTH OF SOFT-SOLDERED BRASS JOINTS AS A FUNCTION OF AGE AND TEMPERATURE HISTORY,
Los Alamos Scientific Lab., N. Mex.
D. H. Liebenberg. 11 Jan 67, 7p
Contract W-7405-eng-36

Descriptors: (*Joints, *Brass), Soldering, Noise, Metal joints, Tin, Lead, Thickness, Tensile properties.

For abstract, see NSA 21 15.
LA-3658 HC$3.00 MF$0.65

13A. Air Conditioning, Heating, Lighting, and Ventilating

NOMINAL 18,000 BTU/HR, COMPACT, HORIZONTAL, AIR CONDITIONING UNITS,
Army Engineer Research and Development Labs Fort Belvoir Va
Jerry L. Wilson. Jun 67, 120p Rept no. AERDL-1902

Descriptors: (*Air conditioning equipment, Acceptability), Design, Performance (Engineering), Heating, Cooling, Acoustics.

The report covers the final engineer design testing of three nominal 18,000 Btu/hr, compact, horizontal, air conditioning models. These are base-mounted, air-cooled, monochlorodifluoromethane refrigerant (R-22) charged, electric-motor-driven, 230-volt, 1-phase, 60-cycle (Model MC20HAL6-230); 208-volt, 3-phase, 60-cycle (Model MC20HAL6-208); and 208-volt, 3-phase, 400-cycle (Model MC20HAL4-208) units. The report concludes: The models meet the design objective of compact, lightweight construction; the units meet the capacity requirements in both heating and cooling and have demonstrated advantageous airflow characteristics; the units are suitable for applications which require large cooling capacities in a small, compact envelope; all models present desirable sound characteristics when properly applied in a system enclosure. (Author)
AD-655 853 HC$3.00 MF$0.65

SHELTER LIGHTING KIT.
Final rept.,
General American Transportation Corp Niles Ill General American Research Div
R. B. Neveril, and H. F. Behls. Jan 67, 95p Rept no. GARD-1400

Descriptors: (*Fallout shelters, *Lighting equipment), (*Civil defense systems, *Power supplies), Performance (Engineering), Costs, Light transmission, Fluorescence, Luminescence, Voltage.

The Shelter Lighting Kit includes a manually-driven power unit and a fluorescent lighting system. Two power unit designs are presented for preproduction fabrication and evaluation. One power unit has a generator mounted on a bicycle-type frame and driven by a chain and sprocket transmission; while the other unit has a generator with an integral geared transmission mounted on a folding tripod frame. Both power units are designed for one-man operation with a power input of 0.1 horsepower at a nominal pedal speed of 55 rpm and a nominal generator output of 50 watts at 120 volts AC. The selection of either design for the production model will depend on their performance and a cost analysis. The fluorescent lighting system consists of two adjustable lamp fixtures and two 20-watt or 25-watt preheat fluorescent lamps operated in series (selected lamp wattage will depend on the overall system efficiency). The estimated production cost of the lighting kit is $90. An incandescent lighting system is proposed as an optional accessory for night lighting or background illumination in multi-room shelters. This lighting system consists of five 10-watt incandescent lamps with adapter sockets and five 50-foot extension cords. The estimated cost of this accessory is $7.30.
AD-655 904 HC$3.00 MF$0.65

PERFORMANCE OF ASPEN WOOD EXCELSIOR FOR USE IN EVAPORATIVE COOLERS.
Final rept.,
General American Transportation Corp Niles Ill General American Research Div
R. H. Henninger, and H. F. Behls. Jan 67, 49p Rept no. GARD-1268-1

Descriptors: (*Shelters, Cooling + ventilating equipment), (*Cooling + ventilating equipment, Materials), (*Evaporators, Performance (Engineering)), Wood, Fluid flow, Effectiveness, Air, Water, Systems engineering.
Identifiers: Evaporative cooling systems, Excelsior.

Evaporative coolers are devices which have potential application in shelter ventilation and cooling equipment systems analysis. Results are reported of laboratory tests conducted to determine the saturating effectiveness and air flow resistance of aspen wood excelsior when used as the water evaporating media in a drip-type evaporative air cooler. The saturating effectiveness for the 2-in. thick pad of 1.5 lb/cu. ft. of cell volume decreased steadily from 92% at 100 ft/min. face velocity to 73% at 500 ft/min. Doubling the thickness resulted in a saturating effectiveness that was almost independent of the face velocity and constant at 97%, while doubling the media mass density gave a saturating effectiveness that varied from 97% to 100 ft/min. to 91% at 500 ft/min. To obtain these saturation effectivenesses, the quantity of water recirculated in the drip-type cooler must exceed 5 times the amount evaporated into the air. The air flow resistance of the 2-in. thick pad ranged from 0.017 in. of water at 150 ft/min. to 0.09 in. of water at 400 ft/min. Doubling the thickness of the pad resulted in an air flow resistance which was twice that of the 2-in. pad, while doubling the density increased the air flow resistance by more than three times that of the 2-in. pad. (Author)
AD-655 905 HC$3.00 MF$0.65

AN IMPROVED OVEN FOR ACCELERATED AGING OF POLYVINYL CHLORIDE COMPOUNDS,
Monsanto Chemical Co Springfield Mass
Roger M. Sherwood, and Stanley J. Boronski. 1967, 6p

Descriptors: (*Furnaces, Aging (Materials)), Polyvinyl chloride, Panels (Structural), Diffusion, Gas flow, Air, Heat treatment.

It was demonstrated that reproducibility of accelerated aging results can be attained by using diffusion screens at the inlet panel in conjunction with a rotating specimen rack. It is believed that, since removal of the existing inlet panel is unnecessary, all makes of forced-convection ovens using wall-to-wall air flow can easily be converted to diffusion ovens. The cost of this conversion is minimal because the diffusion principle is simple. Best of all, the oven capacity remains essentially unchanged, and the oven still can be loaded and unloaded quickly and easily. (Author)
AD-656 202 HC$3.00 MF$0.65

ABLATIVE LIGHT SOURCES.
Technical rept.,

Group 13A—Air conditioning, heating, lighting, and ventilating

Army Electronics Command Fort Monmouth N J
R. G. Buser, and W. P. Rahilly. Jun 67, 19p Rept no. ECOM-2842

Descriptors: (*Lighting equipment, Ablation), (*Discharge tubes, Lighting equipment), Thermoplastics, Electrical properties, Optical properties, Emissivity, Performance (Engineering).
Identifiers: Ablative light sources.

Electrical and optical properties of ablative light sources are discussed. For the range of parameters studied the observed light emission depends mainly on the pressure developed during the discharge which itself is proportional to energy delivered to the lamp. Mechanical and electrical characteristics combined with optical properties comparable to commercial flash tubes should permit useful technical applications. (Author)
AD-656 459 HC$3.00 MF$0.65

REPORT OF CORROSION TESTS AND ANALYSIS OF COMPACT HEAT EXCHANGERS,
Army Engineer Research and Development Labs Fort Belvoir Va
Oscar Oldberg. Jun 67, 12p

Descriptors: (*Aluminum, Corrosion inhibition), (*Heat exchangers, *Corrosion), Air conditioning equipment, Guided missiles (Surface-to-air), Analysis, Failure (Mechanics), Environmental tests, Salt spray tests, Brazing, Coatings.
Identifiers: Hawk.

Two major considerations to be taken into account when using brazed aluminum heat exchangers for military environmental control units are highlighted from the corrosion observations. The standard brazed aluminum construction must have an organic or equally resistive coating for protection against high salt atmospheres which exist in many areas of the world. An improvement in corrosion resistivity through material and construction changes is also desirable to add to the benefits obtainable through protective coatings, such as use of Alclad for the prime surface. (Author)
AD-656 617 HC$3.00 MF$0.65

NOMINAL 9,000-BTU/HR, COMPACT, HORIZONTAL, AIR-CONDITIONING UNITS.
Final rept.,
Army Engineer Research and Development Labs Fort Belvoir Va
Roy Peterson. Jul 67, 142p Rept no. AERDL-1903

Descriptors: (*Air conditioning equipment, Acceptability), Environmental tests, Cooling, Heating, Electrical properties, Shock resistance, Vibration, Noise, Radiofrequency interference.

Tests were conducted to evaluate and improve the prototype development of compact, horizontal 9,000-Btu/hr air-conditioning units. Functional tests included cooling capacity, heating capacity, cooling operation at return-air temperatures as high as 150F, cooling operation at outdoor ambient air temperatures as low as 0F, and heating operation with inside ambient temperature as low as -55F. Tests were made to determine electrical characteristics under normal as well as conditions of voltage and frequency different from nameplate values. Environmental testing included the duress of shock, vibration, and adverse weather conditions as well as noise and radio frequency interference. Improvements were made and the resulting unit has simple operation, adequate capacity, and is sufficiently durable to operate in world-wide climates. (Author)
AD-656 743 HC$3.00 MF$0.65

A GRAVITY INDEPENDENT VAPOR ABSORPTION REFRIGERATOR.
Dynatech Corp., Cambridge, Mass.
J. R. Blutt, and S. E. Sadek. Jul 67, 157p NASA-CR-836, REPT.-695
Contract NASW-1372

Descriptors: *Gravity, *Refrigeration, *Systems design, *Vapor, Absorption, Cooling, Design, Evaluation, Operation, Radiation, Shield, Space, Suit, System, Thermal.

For abstract, see STAR 05 18.
N67-32550 HC$3.00 MF$0.65

THE RESULTS OF ULTRASONIC TESTING IN THE PRACTICE OF MACHINE AND BOILER CONSTRUCTION CONCERNING THE MATERIAL AND STRENGTH PROPERTIES OF COMPONENTS,
Division of Technical Information Extension (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 13H.
For abstract, see NSA 21 15.
ORNL-TR-1369 HC$3.00 MF$0.65

13B. Civil Engineering

PHASE COMPOSITION OF FROZEN MONTMORILLONITE-WATER MIXTURES FROM HEAT CAPACITY MEASUREMENTS.
Cold Regions Research and Engineering Lab Hanover N H
For primary bibliographic entry see Field 8M.
AD-656 601 HC$3.00 MF$0.65

ABSTRACTS OF PAPERS, WATER AND DESALINATION INFORMATION MEETING, MARCH 28-29, 1967.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 7A.
For abstract, see NSA 21 15.
ORNL-4115 HC$3.00 MF$0.65

OPTIMUM ALLOCATION OF TRANSPORTATION TERMINALS IN URBAN AREAS.
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 15E.
PB-173 684 HC$3.00 MF$0.65

ELECTRONIC COMPUTER PROGRAM FOR FLOOD RECORD COMPILATION AND FREQUENCY PLOT,
Bureau of Public Roads, Washington, D. C. Office of Research and Development.
For primary bibliographic entry see Field 8H.
PB-175 511 HC$3.00 MF$0.65

THE ECONOMIC IMPACT OF INTERSTATE HIGHWAY 10 ON A RURAL AREA EAST OF HOUSTON, TEXAS.
Research rept.,
Texas Transportation Inst., College Station.
Jesse L. Buffington. Mar 67, 31p RR-4-8, Bull-37
Availability: Original document in color until exhausted. Prepared in cooperation with Texas Highway Dept. and Bureau of Public Roads, Washington, D. C. Rept. on Economic Impact of the Interstate System on Selected Areas in Texas.

Descriptors: (*Roads, *Texas), (*Economics, *Rural areas), Traffic, Volume, Commerce, Maps, Costs, Terrain, Money, Tables.

The report is on a segment of I-10 beginning about 21 miles east of the Houston, Texas central business district and extending nine miles further east. The report involves a before and after study of land values and land use for a thirteen year period. A survey and analysis was made of businesses operating in 1958, the last year before the new highway was opened to traffic, and in 1962, the last year of the study. The researcher found that land values increased significantly more in the study area than in the control area. This control area is similar to the study area so far as land use is concerned and is located about one mile directly north of the study area. Tracts abutting I-10 received a greater initial impact although the impact of the new highway on study area land values was evident regardless of whether the tracts selling were abutting or not abutting the facility. The new highway affected the eastern section study area land values much more than those in the more highly developed section in the western half of the study area nearer Houston. The extent of changes in the quantity of study area land in various uses between 1954 and 1962 indicates a considerable highway influence on land use. There was approximately a 44 percent decrease in the acreage of agricultural land during this period and a corresponding increase in the commitment of land to higher uses. In the business activity phase of this research findings indicate that commercial and industrial activity increased between 1958 and 1962 in the study area. A major petrochemical plant located along I-10 and is the most significant sign of industrial economic change. The volume of gross sales of the cooperating retail businesses increased during that period. (Author)
PB-175 630 HC$3.00 MF$0.65

PERIPHERAL LAND STUDY: ECONOMICS, ESTHETICS, AND HIGHWAYS,
Washington Univ., Seattle. Dept. of Urban Planning.
Thomas J. Norton, Claudio Arenas, and Richard D. Shinn. Mar 67, 71p Rept. no. 0880
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Economics, Roads), (*Urban planning, Roads), Urban areas, Traffic, Analysis, Maps, Tables, Industries, Terrain, Intensity, Vehicles.

This study related land value changes to four chosen independent variables: sign density, zoning regulation, land use intensity, and average daily traffic. The major finding was that the presence of signs did not contribute measurably to land value changes. However, land values analyzed in the study did apparently rise slightly faster or decrease a bit slower where there is an absence of signs; the authors believe this change may be explained by market inperfections, assessment practices, and by factors unique to each property. The authors conclude that amenity and aesthetics do make a contribution to land values, along with accessibility and land use and a myriad of other factors.
PB-175 632 HC$3.00 MF$0.65

EFFECTS OF CHEMICAL ADMIXTURES IN CONCRETE AND MORTAR.
Texas Transportation Inst., College Station.
For primary bibliographic entry see Field 11B.
PB-175 634 HC$3.00 MF$0.65

INVESTIGATION OF ROCK SLOPE PROTECTION MATERIAL.
Research rept.,
California State Div. of Highways. Materials and Research Dept.
J. Gamble, and R. Mearns. 21 Apr 67, 128p M/R-632561
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Rock (Geology), Deterioration), (*Roads, Performance (Engineering)), Freezing, Wear resistance, Tests, Maintenance, Construction, Sandstone, Basalt, Limestone, California.
Identifiers: Evaluation.

The use of rock slope protection material on highway construction projects in California has in-

creased markedly in the last decade. Prior to this study severe deterioration of several installations in California was known, but there was little knowledge of the general performance of rock slope installations throughout the State. Inspection of numerous installations of varied age and rock type in all sections of the State showed that only a few were constructed of poor quality rock. Consequently, failures due to rock disintegration are relatively rare. The weathering processes and their effect on rock slope installations are evaluated, and the conclusion is drawn that initially sound rock will be little affected by weathering during the design life of an installation. Test records compiled since 1957 show wide discrepancies in correlation between the specification test results and performance. A range of test values was set up and performance categories established so that correlations could be made between test results and performance. The Wet-Dry and Freeze-Thaw methods were evaluated by testing blocks, various particle sizes, and varying the test procedure. Considerable experimental testing was done to develop a simple and practical Rapid Abrasion test. Finally, two index formulas were devised that yield index numbers which are related to performance. Both formulas are significantly better performance predictors than the present specifications.
PB-175 638 HC$3.00 MF$0.65

CREEP RECOVERY AND CREEP OF PRESHRUNK CONCRETE,
Missouri Univ., Columbia. Dept. of Civil Engineering.
For primary bibliographic entry see Field 11B.
PB-175 639 HC$3.00 MF$0.65

ANALYSIS OF SIMPLY SUPPORTED BOX GIRDER BRIDGES: REPORT OF AN INVESTIGATION,
California Univ., Berkeley. Structures and Materials Research.
For primary bibliographic entry see Field 13M.
PB-175 646 HC$3.00 MF$0.65

HIGHWAY LOCATION AND DESIGN RESEARCH PROJECT.
Final research rept., Jan 63-Mar 66,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
Paul O. Roberts, Jr., and John H. Suhrbier. Dec 66, 137p R66-9
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, *Design), (*Economics, Roads), Costs, Operation, Efficiency, Construction, Management engineering, Computers, Statistical analysis, Traffic, Data storage systems, Effectiveness, Data processing systems, Massachusetts.

Contents: Economic analysis; Optimum design procedures; Data acquisition, storage, retrieval and graphical input-output; Management systems. (Author)
PB-175 649 HC$3.00 MF$0.65

FLOW BEHAVIOR OF ASPHALT CEMENTS.
Research rept.,
Kentucky Dept. of Highways, Lexington. Div. of Research.
W. A. Mossbarger, Jr., and J. A. Deacon. May 67, 152p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Asphalt, *Mechanical properties), (*Pavements, *Roads), Viscosity, Shear stresses, Viscoelasticity, Temperature, Equations, Creep, Tables, Classification, Deformation, Viscosimeters.

The Kentucky Department of Highways in cooperation with the Bureau of Public Roads is conducting a continuing investigation of the fundamental mechanical properties of flexible pavement materials. The ultimate objective of this investigation is to gain sufficient knowledge of the fundamental mechanical behavior of these materials to support the establishment of a responsive flexible pavement design procedure. The current report summarizes results of a second phase of the continuing investigation in which the preparatory efforts have been expended to encompass the creep testing of 13 asphalt cements in a second rotating coaxial cylinder viscometer. The 13 asphalt cements were selected to represent a variety of crude sources, penetration grades, and manufacturing processes. (Author)
PB-175 650 HC$3.00 MF$0.65

IMPACT OF HIGHWAY BEAUTIFICATION ACT ON OUTDOOR ADVERTISING FIRMS IN WASHINGTON STATE,
Washington Univ., Seattle. Graduate School of Business Administration.
For primary bibliographic entry see Field 5C.
PB-175 651 HC$3.00 MF$0.65

SEVERANCE DAMAGE STUDY, CASES 1-65,
Louisiana Polytechnic Inst., Ruston. Div. of Business and Economic Research.
For primary bibliographic entry see Field 5C.
PB-175 652 HC$3.00 MF$0.65

THE VALUE OF TIME FOR PASSENGER CARS: A THEORETICAL ANALYSIS AND DESCRIPTION OF PRELIMINARY EXPERIMENTS.
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 13G.
PB-175 653 HC$3.00 MF$0.65

13C. Construction Equipment Materials, and Supplies

AUTOMATIC CONVEYOR FOR POLYETHYLENE GRANULES,
Western Electric Co Inc Omaha Neb
H. H. Burroughs, G. A. Quick, Jr., and J. F. Sheehan, Jr. 1959, 14p
Prepared for presentation at the Annual Symposium on Technical Progress in Communication Wire and Cables (8th), Asbury Park, N. J., December 1-3, 1959.

Descriptors: (*Conveyors, *Polyethylene plastics), Automatic, Containers, Polyvinyl chloride, Colors, Granules, Pneumatic systems.

The paper describes one portion of the automatic handling system capable of delivering ten colors of polyethylene to forty two insulating lines with a maximum number of colors available to each line.
AD-656 249 HC$3.00 MF$0.65

13D. Containers and Packaging

BULK HANDLING OF POLYETHYLENE IN CABLE MANUFACTURING,
Western Electric Co Inc Baltimore Md
For primary bibliographic entry see Field 11I.
AD-656 420 HC$3.00 MF$0.65

PACKAGING PRACTICE RECOMMENDATION. PACKAGING OF STANDARD MALLEABLE IRON SCREWED PIPE FITTINGS, BLACK OR GALVANIZED (FOR 2-INCH PIPE SIZE AND UNDER),
National Bureau of Standards, Washington, D. C.
For primary bibliographic entry see Field 13H.
SPR-248-52 HC$3.00

13E. Couplings, Fittings, Fasteners, and Joints

A REDUNDANT-FORCE METHOD FOR THE INELASTIC ANALYSIS OF MECHANICALLY FASTENED JOINTS,
North American Aviation Inc Columbus Ohio Columbus Div
R. W. Gehring, and C. H. Maines. 31 Jan 67, 74p
NAEC-ASL-1103
Contract N156-45330

Descriptors: (*Joints, Mechanical properties), Force (Mechanics), Analysis, Elasticity, Mechanical fasteners, Failure (Mechanics), Strain (Mechanics), Deformation, Stabilizers (Horizontal tail surface).

An inelastic redundant-force method for the stress and strength analysis of multifastener, multi-plate splice joints is described. The methods predict the allowable ultimate load, as well as the plate element and fastener load distribution at any desired load level. Tapered splices and mixed materials are allowed for and the plates may be discontinuous. Examples are shown for use of the method and application to a full-scale aircraft component major splice joint. The conclusion is that the method gives accurate results for failure prediction including failing load, mode of failure, and failure location. (Author)
AD-656 057 HC$3.00 MF$0.65

TERMI-POINT WIRING DEVICES, A NEW APPROACH TO POINT-TO-POINT WIRING,
Amp Inc Harrisburg Pa
For primary bibliographic entry see Field 9A.
AD-656 112 HC$3.00 MF$0.65

A RESIN-SEALED APPROACH TO COMMUNICATIONS SPLICING,
Minnesota Mining and Mfg Co St Paul
For primary bibliographic entry see Field 9A.
AD-656 263 HC$3.00 MF$0.65

13F. Ground Transportation Equipment

RAIL IMPACT TESTING ON LONG TRAVEL SHOCK MOUNTS, MODELS 230 AND 570.
Engineering rept.,
Army Transportation Engineering Agency Fort Eustis Va
C. O. Butler. Jul 67, 182p Rept no. USATEA-67-4

Descriptors: (*Railroad cars, *Shock (Mechanics)), (*Impact tests, *Cargo), Attenuation, Recording systems, Magnetic tape, Gravity, Weight, Acceleration, Tables.

The report covers a transportation engineering analysis of the shock-attenuating capabilities of the Models 230 and 570 Long Travel Shock Mounts on cargoes having different weights, dimensions, and centers of gravity, and an analysis of the data recorded simultaneously on different types of recorders. Test results showed that the longitudinal shock at the center of gravity of the cargo boxes was generally increased when the height above the shock-mount loading platform was increased, and that vertical shock at the center of gravity was generally decreased when the height above the shock-mount loading platform was increased. Of the 160 impact tests recorded simultaneously on different types of recorders, 41 recordings were identical in all channels. In the remaining 119 recordings, the differences ranged from 0.1g to 8.5g. (Author)
AD-656 600 HC$3.00 MF$0.65

THE STUDY OF TRANSPORTATION REQUIREMENTS USING NATIONAL AND MULTIREGIONAL INPUT-OUTPUT TECHNIQUES,
Harvard Economic Research Project, Cambridge, Mass.
Karen R. Polenske. Apr 67, 76p
Prepared for the Department of Transportation, Washington, D. C.

Descriptors: (*Transportation, *Economics), Costs, Labor, Tables, Industries, Commerce, Money, Consumption, Statistical analysis, Classification.

The report contains a discussion of input-output models and how they can be used to describe and analyze the economic interdependence of the transportation sector with the rest of the American economy. Whenever changes in one sector of the economy greatly affect another sector, a partial economic analysis of only the one sector usually fails to account for the entire impact of a given change. As we shall see, variations in the demand for certain products does affect the transportation requirements indirectly as well as directly; also, changes within the transport sector have an indirect as well as a direct impact on the rest of the economy. Interindustry input-output analysis can be used to estimate the full impact on the transportation industry of variations in the level and composition of final demand, to help provide economic forecasts of the transportation industry, or to study specific changes in transportation, such as the introduction of piggy-back, fishy-back, supersonic transport, hydrofoils, etc. If a multiregional input-output scheme is used, a basis is provided for consistent estimates of transportation requirements by industry and region. (Author)
PB-174 742 HC$3.00 MF$0.65

ANNUAL REPORT 1966.
National Capital Transportation Agency, Washington, D. C.
1 Jan 67, 28p

Descriptors: (*Transportation, *District of Columbia), Management engineering, Specifications, Traffic, Engineering, Urban areas, Budgets, Law, Reports.

Contents: Transit development program; Agency operations - 1966; Engineering; Board of engineering consultants; Public works coordination; Equipment; Architecture; Planning; Public Information and Community Services; Land acquisition and relocation services; The Washington metropolitan area transit authority compact. (Author)
PB-174 947 HC$3.00 MF$0.65

THE STATE OF THE ART OF TRAFFIC SAFETY. A CRITICAL REVIEW AND ANALYSIS OF THE TECHNICAL INFORMATION ON FACTORS AFFECTING TRAFFIC SAFETY. PART I.
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 13L.
PB-175 615 HC$3.00 MF$0.65

FEASIBILITY OF COMPUTER STORAGE AND RETRIEVAL OF FREIGHT TARIFF INFORMATION, PHASE II.
Battelle Memorial Inst., Columbus, Ohio. Columbus Labs.
For primary bibliographic entry see Field 5C.
PB-175 706 HC$3.00 MF$0.65

13G. Hydraulic and Pneumatic Equipment

ORDNANCE ENGINEERING DESIGN HANDBOOK: SERVOMECHANISMS. SECTION 4: POWER ELEMENTS AND SYSTEM DESIGN, CONSISTING OF CHAPTERS 14-20.
Office of the Chief of Ordnance Washington D C
For primary bibliographic entry see Field 19D.
AD-655 899 HC$3.00 MF$0.65

AUTOMATIC CONVEYOR FOR POLYETHYLENE GRANULES,
Western Electric Co Inc Omaha Neb
For primary bibliographic entry see Field 13C.
AD-656 249 HC$3.00 MF$0.65

TRANSITION TO TURBULENCE FOR SUBMERGED INCOMPRESSIBLE AND FREE COMPRESSIBLE FLUID JETS.
Martin Co Orlando Fla
For primary bibliographic entry see Field 20D.
AD-656 780 HC$3.00 MF$0.65

THE VALUE OF TIME FOR PASSENGER CARS: A THEORETICAL ANALYSIS AND DESCRIPTION OF PRELIMINARY EXPERIMENTS.
Final rept. (Vol. I),
Stanford Research Inst., Menlo Park, Calif.
Dan G. Haney. May 67, 172p
Contracts CPR-11-0959, CPR-11-7995
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. See also PB-170 878.

Descriptors: (*Passenger vehicles, Transportation), (*Transportation, Time), (*Economics, Time), Roads, Traffic, Mathematical models, Costs, Mathematical prediction, Motivation, Decision making.

The study was directed to the determination of the value of travel time saved through investments in highway improvement projects. Results of the research included: (1) a review of the history of the value of time, (2) a discussion of the theoretical problems encountered in estimating values of passenger car travel time, (3) a review of the experimental analyses leading to estimates of the value of time, and (4) the development of mathematical models that can be used to derive value-of-time estimates for specific situations. (BPR abstract).
PB-175 653 HC$3.00 MF$0.65

13H. Industrial Processes

MACHINING DATA FOR NUMERICAL CONTROL TURNING,
Metcut Research Associates, Inc., Cincinnati, Ohio.
Michael Field, Clarence L. Mehl, and John F. Kahles. Jun 66, 77p
AFMDC-66-1.1
Contract AF 33 (615)-5262

Descriptors: (*Machining, Tables), Heat-resistant metals + alloys, Stainless steel, Titanium alloys, Machine tools, Steel, Cutting fluids, Hardening, Microstructure, Refractory metal alloys, Cutting.

The report presents an extensive set of machining data selected from six USAF Machinability Reports. Data are tabulated and arranged in formats including machining variables such as tool material, tool geometry, cutting fluid, depth, feed, and tool life end point. For each of the data lines, the relationship between tool life and cutting speed is expressed in at least three sets of data, thereby making it possible to optimize for maximum production or minimum cost. While these data are expected to be of considerable assistance in providing data for numerical control applications, they are also of great value in any type of machining situation involving the materials for which machining data are presented. Specifically this report, the first of a series, pertains to turning. (Author)
AD-483 994 HC$3.00 MF$0.65

GRINDING RATIOS FOR AEROSPACE ALLOYS,
Metcut Research Associates, Inc., Cincinnati, Ohio.
For primary bibliographic entry see Field 11F.
AD-483 995 HC$3.00 MF$0.65

MACHINING DATA FOR BERYLLIUM METAL,
Metcut Research Associates, Inc., Cincinnati, Ohio.
John F. Kahles, and Robert F. Snider. Jun 66, 30p
AFMDC-66-3
Contract AF 33 (615)-5262

Descriptors: (*Machining, Tables), (*Beryllium alloys, Machining), Grinding, Hardness, Microstructure, Chemical milling, Saws, Toxicity, Machine tools, Heat-resistant metals + alloys, Cutting fluids, Electrodeposition, Reamers.

The report contains evaluated machining information for beryllium which has been extracted from many sources. Machining data are tabulated and presented in chart form for the following processes: turning, milling, drilling, band sawing, grinding, boring, trepanning, reaming, routing, tapping, electrical discharge machining, electrochemical machining, and chemical machining. Also included is a general comment section dealing with the problems associated with beryllium machining, such as twinning, microcracking, toxicity, chipout and spalling, and cutting fluids. (Author)
AD-485 297 HC$3.00 MF$0.65

MACHINING DATA FOR NUMERICAL CONTROL FACE MILLING,
Metcut Research Associates, Inc., Cincinnati, Ohio.
Michael Field, Clarence L. Mehl, and John F. Kahles. Aug 66, 88p
AFMDC-66-1.2
Contract AF 33 (615)-5262

Descriptors: (*Machining, Tables), Refractory metal alloys, Milling machines, Titanium alloys, Stainless steel, Heat-resistant metals + alloys, Steel, Machine tools, Hardening, Tensile properties.

The report presents an extensive set of machining data selected from six USAF Machinability Reports. Data are tabulated and arranged in formats including machining variables such as tool material, tool geometry, cutting fluid, depth, width, feed, and tool life end point. For each of the data lines, the relationship between tool life and cutting speed is expressed in at least three sets of data, thereby making it possible to optimize for maximum production or minimum cost. While these data are expected to be of considerable assistance in providing data for numerical control applications, they are also of great value in any type of machining situation involving the materials for which machining data are presented. Specifically this report, the second of a series, pertains to face milling. (Author)
AD-487 156 HC$3.00 MF$0.65

MACHINING DATA FOR NUMERICAL CONTROL DRILLING,
Metcut Research Associates, Inc., Cincinnati, Ohio.
Michael Field, Clarence L. Mehl, and John F. Kahles. Aug 66, 72p
AFMDC-66-1.3
Contract AF 33 (615)-5262

Descriptors: (*Machining, Tables), Drilling, Machine tools, Steel, Titanium alloys, Stainless steel, Refractory metal alloys, Heat-resistant metals + alloys, Costs, Cutting fluids.

The report presents an extensive set of machining data selected from six USAF Machinability Reports. Data are tabulated and arranged in formats including machining variables such as tool material, tool geometry, cutting fluid, depth, feed, and tool life end point. For each of the data lines, the relationship between tool life and cutting speed is expressed in at least three sets of data, thereby making it possible to optimize for maximum production or minimum cost. While these data are expected to be of considerable assistance in providing data for numerical control applications, they are also of great value in any type of machining situation involving the materials for which machining data are presented. Specifically this report, the third of a series, pertains to drilling. (Author)
AD-488 018 HC$3.00 MF$0.65

A COMPUTER PROGRAM TO DETERMINE ACCEPTANCE CRITERIA AND THE OPERATING CHARACTERISTIC CURVE WHEN SAMPLING VARIABLES (QUALITY CONTROL).
Technical rept.,
Picatinny Arsenal Dover N J Ammunition Engineering Directorate
Donald C. Rappaport. Jul 67, 22p
PA-TR-3584

Descriptors: (*Quality control, Statistical analysis), (*Computer programs, Quality control), Sampling, Acceptability, Probability.

A variable plan for acceptance inspection is based upon the sample mean and the sample standard deviation. This program computes a value K, such that the sample mean plus K times the sample standard deviation will indicate the acceptability of a lot. If the specified upper limit is exceeded, the lot is not acceptable. This program will compute K from a given sample size and one point on the operating characteristic curve, or will compute K and the sample size from two points on the operating characteristics curve and will then draw the operating characteristics curve.
AD-655 849 HC$3.00 MF$0.65

FUNCTIONAL LAGRANGE EXPANSION IN STATE SPACE AND THE s-DOMAIN.
Washington Univ St Louis Mo
For primary bibliographic entry see Field 12A.
AD-655 987 Not available from CFSTI.

APPLICATION OF PVC WIRE INSULATION BY FLUIDIZED BED METHODS,
Diamond Alkali Co Painesville Ohio
Alan I. Renkis. 1962, 11p
Prepared for presentation at Annual Wire and Cable Symposium (11th) Asbury Park, New Jersey 27-30 Nov 1962.

Descriptors: (*Plastic coatings, *Fluidized bed processes), Manufacturing methods, Polyvinyl chloride, Electric insulation, Electric wire.

The purpose of the study, was to supplement the previous investigations in the fluidized wire coating area with specialized compound developments. It was the intention to approach this subject from the raw material end, thus presenting an intimate view of the basic requirements in raw materials, discuss their compounding, and determine the physical and electrical properties of the finished materials. An experimental induction heated wire coating set-up was also parpared to determine the applicability of the developments. To achieve the ultimate in economy, processing ease and product homogeneity, the approach was through the dry-blending process, rather than the more conventional and costly freeze-grinding methods for fluidizable powder preparation. In the dryblending process, a low molecular weight polyvinyl chloride resin is intensely blended in a high speed mixer with other compounding ingredients to an elevated temperature short of the resin's fluxing temperature. The nature of the specific resin employed is such that high amounts of plasticizer may be readily absorbed without impairing the free flowing requirements of the fluid bed powders. (Author)
AD-656 060 HC$3.00 MF$0.65

EXTRUDING HIGH DENSITY POLYETHYLENE FOR QUALITY AND SAVINGS,
Grace (W R) and Co Clarksville Md
E. Parker Stiles. 1962, 15p
Prepared for presentation at Annual Wire and Cable Symposium (11th) Asbury Park, N. J. 28-30 Nov 1962.

Descriptors: (*Polyethylene plastics, *Extrusion), Density, Electric wire, Electric cables, Electric insulation, Plastic coatings.

High density polyethylene has proved itself to be an excellent wire and cable resin from both an electrical and a mechanical point of view. There are some extrusion technique modifications necessary in order to fully utilize the superior characteristics of this material. Improved polymer technology has developed the wherewithal to produce a very stable material capable of long term reliable service under the most severe environments. (Author)
AD-656 065 HC$3.00 MF$0.65

NEW DEVELOPMENTS IN THE MANUFACTURE OF COMMUNICATION CABLE AT OMAHA,
Western Electric Co Inc Omaha Neb
For primary bibliographic entry see Field 9A.
AD-656 073 HC$3.00 MF$0.65

HOT LIQUID VULCANIZATION OF SILICONE RUBBER INSULATED WIRE AND CABLE,
Dow Corning Corp Midland Mich
S. J. Nizinski. 1962, 7p
Prepared for presentation at the Annual Wire and Cable Symposium (11th) held at Asbury Park, N. J., 27-30 Nov 1962.

Descriptors: (*Silicone plastics, Vulcanization), (*Vulcanization, Electric insulation), Electric wire, Electric cables, Liquids, Extrusion, Hot working.

Silicone rubber insulated wire and cable can be hot liquid vulcanized using similar techniques to those used for hot air vulcanizing. The major advantage of hot liquid vulcanization is the faster vulcanization rates which can be obtained. Silicone rubber insulated wire and cable can be vulcanized approximately twice as fast with hot liquid as hot air. Hot liquid vulcanization of silicone rubber insulated wire and cable should be an important consideration for manufacturers who wish to extrude silicone rubber insulated wire and cable at high extrusion rates and with a minimum amount of capital investment for vulcanizing equipment. (Author)
AD-656 074 HC$3.00 MF$0.65

A NEW METHOD FOR THE EXTRUSION AND VULCANIZATION OF QUALITY CABLE SHEATHS,
Pacific Automation Products Inc Glendale Calif
For primary bibliographic entry see Field 9A.
AD-656 075 HC$3.00 MF$0.65

THE COOLING RATE OF POLYETHYLENE INSULATED WIRE DURING THE EXTRUSION PROCESS,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 9A.
AD-656 077 HC$3.00 MF$0.65

SOLID POLYPROPYLENE INSULATION FOR WIRE AND CABLE APPLICATIONS,
United States Steel Corp Worcester Mass American Steel and Wire Div
For primary bibliographic entry see Field 11I.
AD-656 078 HC$3.00 MF$0.65

RECENT DEVELOPMENT IN SMALL-CORE COAXIAL CABLE,
Standard Telecommunication Labs Ltd Harlow (England)
For primary bibliographic entry see Field 9A.
AD-656 100 HC$3.00 MF$0.65

'EUROPA' CABLE,
Societe Anonyme de Telecommunications Paris (France)
For primary bibliographic entry see Field 9A.
AD-656 113 HC$3.00 MF$0.65

THE EFFECT OF DIE LAND LENGTH ON THE SURFACE APPEARANCE OF LOW MELT INDEX POLYTHENE EXTRUDATES,
Canadian Industries Ltd New Toronto (Ontario) Plastics Div
J. S. King, and J. A. Durno. Dec 63, 9p
Annual Wire and Cable Symposium on Technical Progress in Wires and Cables (12th), Asbury Park, N. J., 4-6 Dec 63.

Descriptors: (*Polyethylene plastics, Extrusion), Surface properties, Plastic coatings, Dies.

It was demonstrated that a decided improvement in the surface finish of cable jacket extrudates can be obtained by the use of dies and mandrels having long lands. This improvement in surface finish is frequently necessary for those low density polythene compounds which exhibit the best physical properties. In the case of 1 inch diameter cable, a land length of 2 inches was found to combine a marked improvement in surface finish with increases of approximately 50% in melt pressure at the breaker plate and 7% in extruder power requirements in comparison to a die and mandrel having no land. These increases are usually commercially tolerable considering the improved quality of the product. Increasing land length above 2 inches gave only minor additional improvement in finish at the expense of further increases in melt pressure at the breaker plate and extruder power requirements. The use of equipment, extrusion temperatures and jacket dimensions other than those used in this trial may produce numerically different results, but the same trends should be observed. (Author)
AD-656 118 HC$3.00 MF$0.65

A NOTE ON SIZE DISTRIBUTION IN GRANULATION, BALLING AND WET PELLETIZATION,
National Research Council of Canada Ottawa (Ontario)
For primary bibliographic entry see Field 7A.
AD-656 129 Not available from CFSTI.

LONGITUDINAL APPLICATION OF INSULATION AND SHIELD ON COMMUNICATION CABLES,
Western Electric Co Inc Chicago Ill
For primary bibliographic entry see Field 17B.
AD-656 168 HC$3.00 MF$0.65

THE INFLUENCE OF EXTRUDER GEOMETRY IN THE PRODUCTION OF HOMOGENEOUS CELLULAR PLASTIC INSULATION,
Bell Telephone Labs Inc Murray Hill N J
E. O. Bauer, and P. E. Fox. Nov 61, 12p
Annual Wire and Cable Symposium (10th), Asbury Park, N. J., 29 Nov 61.

Descriptors: (*Expanded plastics, Electric insulation), (*Extrusion, Expanded plastics), Plastic coatings, Dies, Geometry.

The experiment which is described in this paper involves expanded polypropylene insulation on 19-gauge wire. The wall thickness was 9 mils. The gas for the expansion of the polypropylene was supplied by the decomposition of a chemical blowing agent which was dry mixed with the plastic granules before being introduced into the extruder hopper. With suitable control of extrusion conditions and adequate nucleation, what appeared to be a uniform fine-cell structure was produced in the laboratory by this method. Difficulties were experienced, however, with the integrity of the insulation as evidenced by the large number of faults picked up by the spark tester on the extrusion line. Examination of the insulation revealed that there was a longitudinal seam of relatively solid material containing large air cells. In some instances the large cells were interconnected so that there was an air dielectric path from the conductor to the surface of the insulation. These points registered as faults on the spark tester and as high capacitance excursions on the capacitance monitor chart. It is the purpose of this paper to describe (1) an experiment which revealed the cause of this condition, and (2) the development of a crosshead flowpath which provided the solution to the problem.
AD-656 170 HC$3.00 MF$0.65

CABLE SPLICING UTILIZING NEW SILICONE MATERIALS,
Dow Chemical Co Midland Mich
R. E. Kincaid. Nov 60, 14p
Prepared for presentation at the Annual Wire and Cable Symposium (9th), Asbury Park, N. J., 30 Nov-2 Dec 60.

Descriptors: (*Electric cables, Joining), Silicone plastics, Electric insulation, Liquid immersion tests, Electrical properties.

Tests were conducted to investigate the possibilities of using several new silicone materials in electrical cable splices show these materials to be an improvement over many existing splicing materials. The silicone materials described in this paper are easy to handle and apply regardless of temperature. In contrast to many splice insulating systems now used, these materials remain flexible and retain their physical and electrical properties over a wide temperature range. (Author)
AD-656 186 HC$3.00 MF$0.65

PRODUCTION BY AUTOGENOUS EXTRUSION,
Western Electric Co Inc Baltimore Md
A. N. Gray. 1960, 10p
Annual Wire and Cable Symposium Cable (9th), Asbury Park, N. J., Nov 30 and December 1 and 2, 1960.

Descriptors: (*Extrusion, Plastics), Machines, Operation, Conveyors, Heating, Polyvinyl chloride, Polyethylene plastics.

The advantages of the method are: (1) Absolute constancy and uniformity of stock discharge temperature at any chosen screw speed. (2) Simplified operation of the extruder. (3) Material conservation. (4) Simplified design, construction and installation. (5) Production potential.
AD-656 188 HC$3.00 MF$0.65

SILICONE COMPOUND DEVELOPMENT AND QUALITY CONTROL THROUGH USE OF THE MOONEY VISCOMETER,
General Electric Co Waterford N Y Silicone Products Dept
For primary bibliographic entry see Field 11I.
AD-656 199 HC$3.00 MF$0.65

AN IMPROVED OVEN FOR ACCELERATED AGING OF POLYVINYL CHLORIDE COMPOUNDS,
Monsanto Chemical Co Springfield Mass
For primary bibliographic entry see Field 13A.
AD-656 202 HC$3.00 MF$0.65

SIMULTANEOUS EXTRUSION OF POLYETHYLENE AND POLYVINYL CHLORIDE COATINGS ON ELECTRICAL CONDUCTORS,
Western Electric Co Inc Baltimore Md
G. E. Henning. 1967, 15p

Descriptors: (*Extrusion, *Plastic coatings), Polyethylene plastics, Polyvinyl chloride, Electric wire, Electric insulation, Copper.

The facilities described in this paper can be used for the same plastic in two different colors. They can, as has been pointed out, be used where two entirely different plastic materials are employed, such as polyethylene and PVC. Two or more conductors can, of course, be coated simultaneously, if the need arises. Moreover, either extruder can be operated entirely as a separate unit by simply inserting the proper tool assembly. The space occupied by the multicoat extrusion facilities, in terms of product turned out, is only about half of what would be required if two separate operations are employed. The saving in investment costs, on the same basis, would be about 40% of the cost of conventional equipment. Substantial operating economies over conventional equipment will result through reduced scrap, maintenance and the more efficient utilization of labor. (Author)
AD-656 205 HC$3.00 MF$0.65

POLYMER REQUIREMENTS AND INSULATING TECHNIQUES FOR OBTAINING THE MAXIMUM BENEFITS OF HIGH DENSITY POLYETHYLENE,
Goodrich-Gulf Chemicals Inc Cleveland Ohio
For primary bibliographic entry see Field 11I.
AD-656 216 Not available from CFSTI.

THE SYSTEMATIC CONTROL OF RUBBER TO METAL ADHESION IN THE WIRE AND CABLE INDUSTRY,
Hughson Chemical Co Erie Pa
Richard P. Stout. 1959, 11p
Annual Wire and Cable Symposium, Asbury Park, N. J., December 2, 1959.

Descriptors: (*Bonding, *Rubber coatings), Adhesives, Metals, Interfaces, Surface properties, Vulcanization, Quality control, Electric insulation.

There are many elements common to adhesive bonding in both the mechanical molded goods industry and the wire and cable industry. Some factors are listed about compounding. The rate of cure is not a problem, but heat transfer may be. Cleanliness of the metal surfaces is of vital importance and that more should be learned about the behavior of wet adhesive when it meets hot, moving rubber under high pressure. If other factors can be held constant, adhesion level can be controlled by selection and dilution of the adhesive.
AD-656 239 HC$3.00 MF$0.65

THE PROBLEM OF DRYING POLYETHYLENE SHEATHING COMPOUND PRIOR TO EXTRUSION,
Western Electric Co Inc Chicago Ill
F. H. Kruger. 1959, 18p
Prepared for presentation at the Annual Wire and Cable Symposium (8th), Asbury Park, N. J.

Descriptors: (*Polyethylene plastics, *Drying), Plastic coatings, Extrusion, Moisture, Mass transfer, Heat transfer.

It was determined that steps must be taken to supply the cable sheathing extruders with dry polyethylene to avoid blisters and rough sheath difficulties. The moisture content of polyethylene sheathing compound should not exceed .04%. Special care is required in making moisture content determinations. Moisture content - relative humidity equilibrium data were obtained from which curves were drawn with the material at temperatures of 80F and 167F. If material is received at low moisture contents and stored until equilibrium is reached with the atmosphere, the moisture content will be above the optimum extrusion level in either winter or summer. The theory of drying is reviewed. Drying rate equations for thru-circulation do not apply to hopper drying because the beds are deeper and the material is stationary on the bed. Extrusion of dried polyethylene apparently does not result in increased extruder outputs. Further development of heat and mass transfer relations for hopper drying are needed together with a precise value of the critical moisture content of the material. (Author)
AD-656 240 HC$3.00 MF$0.65

CABLE SHEATHS AND WATER PERMEABILITY,
Collyer Insulated Wire Co Lincoln R I
For primary bibliographic entry see Field 9A.
AD-656 243 HC$3.00 MF$0.65

MANUFACTURE OF ALUMINUM CONDUCTOR TELEPHONE CABLE,
Western Electric Co Inc Kearny N J
For primary bibliographic entry see Field 17B.
AD-656 254 HC$3.00 MF$0.65

A RESIN-SEALED APPROACH TO COMMUNICATIONS SPLICING,
Minnesota Mining and Mfg Co St Paul
For primary bibliographic entry see Field 9A.
AD-656 263 HC$3.00 MF$0.65

THE EFFECTS OF CONDUCTOR TEMPERATURE ON THE QUALITY OF EXTRUDED VINYL WIRE INSULATION,
Bakelite Co Bound Brook N J
E. E. Griesser, and M. M. Suba. 8 Dec 54, 34p
Prepared in cooperation with Bakelite Co., Hartford Conn. Annual Wire and Cable Symposium, Asbury Park, N. J., December 8, 1954.

Descriptors: (*Electric wire, *Plastic coatings), Vinyl plastics, Temperature, Extrusion, Adhesion, Heating, Shrinkage, Tensile properties, Aging (Materials), Thermal shock, Failure (Mechanics).

The effects of conductor preheating and other variables on the quality of extruded vinyl wire coatings was discussed in great detail. It was seen that heat shock failures could be overcome by extruding the compound at an optimum temperature or hotter. However, very little if any, improvement in other properties is achieved by increased compound temperature without conductor preheating. For this reason, the satisfactory passing of a heat shock test does not imply optimum quality; although conversely, the failure of a heat shock test does imply extremely poor or the poorest quality of extruded vinyl insulation. An attempt was also made to show that slight conductor preheating (i.e. enough to take the chill from the wire) is not sufficient to ensure good quality. The best results in these experiments were obtained with conductor temperatures of 300 and 350 deg. F. Little improvement was made at temperatures above 300 deg. F. Hence it is recommended that conductors for vinyl insulations be heated to at least 300 deg. F. to ensure good quality as determined by optimum physical properties such as maximum tensile strength and elongation and minimum shrinkage. It was also shown that adhesion of insulation to conductor for a given compound can be controlled by controlling the conductor temperature.
AD-656 266 HC$3.00 MF$0.65

QUALITY CONTROL OF VINYL AND POLYETHYLENE ELECTRICAL INSULATING AND JACKETING MATERIALS,

Bakelite Co Bound Brook N J
For primary bibliographic entry see Field 11I.
AD-656 268 HC$3.00 MF$0.65

HOT GAS WELDED SPLICE CLOSURES FOR PLASTIC CABLES,
Ansonia Wire and Cable Co Conn
A. D. Varenelli, and E. R. Kerwin. 1954, 19p
Prepared for presentation at the annual Symposium on Technical Progress in Communication Wires and Cables, Asbury Park, N. J., December 7, 8, 9 1954.

Descriptors: (*Electric cables, Weatherproofing), (*Plastics, *Welding), Coatings, Joints, Gases, Plastic coatings, Thermoplastics, Telephone lines, Seals.

The article describes the procedure for making hot gas welded splices on all plastic telephone cables.
AD-656 274 HC$3.00 MF$0.65

NEW EXTRUSION TECHNIQUES WITH SILICONE RUBBER,
Union Carbide Corp New York Silicones Div
H. H. Bashore, C. E. Simpson, and E. G. Schwarz. 1958, 12p
Annual Wire and Cable Symposium (7th), Asbury Park, N. J., December 2-4, 1958.

Descriptors: (*Extrusion, *Silicone plastics), Manufacturing methods, Elastomers, Specifications, Electric wire, Electric cables.

The latest developments are those of improved processability and fabrication techniques. This technology has been extended to other wire and cable specifications, such as Mil W-8777, Mil C-21941C, Mil W-16878, and individual end-user specifications, and it seems only logical to expect these same processing advantages to appear in a family of solvent resistant, organo-silicone elastomers as well as other areas of future utility in the wire and cable industry. (Author)
AD-656 279 HC$3.00 MF$0.65

COMPOSITE WIRES FOR OPERATION AS ELECTRICAL CONDUCTORS AT ELEVATED TEMPERATURES,
Sylvania Electric Products Inc Warren Pa
For primary bibliographic entry see Field 9A.
AD-656 291 HC$3.00 MF$0.65

A NEW MATERIAL FOR SPLICING WIRE AND CABLE,
Minnesota Mining and Mfg Co St Paul
For primary bibliographic entry see Field 9A.
AD-656 326 HC$3.00 MF$0.65

THICKNESS MEASUREMENT AND CONTROL IN THE MANUFACTURE OF POLYETHYLENE CABLE SHEATH,
Western Electric Co Inc Kearny N J
For primary bibliographic entry see Field 11C.
AD-656 332 HC$3.00 MF$0.65

QUALITY - A COMBINATION OF HORSESENSE AND STATISTICAL METHODS,
Rome Cable Corp N Y
C. Kenneth Hamlin. 14 Dec 53, 14p

Descriptors: (*Quality control, Management planning), Statistical analysis, Acceptability, Production control, Electric cables, Costs, Performance (Human), Man-machine systems.

In this discussion concerning quality control, the author challenges the reader to make libral use of statistical methods whenever possible; but not to lose sight of the greatest asset of all toward quality -- namely, the understanding and cooperation of the man on the machine.
AD-656 333 HC$3.00 MF$0.65

ULTRA ACCELERATORS IN CV VULCANIZATION,
Vanderbilt (R T) Co Inc East Norwalk Conn Rubber Div
L. A. Brooks, J. L. Tronson, and A. C. Rowley. 1955, 32p
Annual Wire and Cable Symposium (4th), Asbury Park, N. J., December 6, 7, and 8, 1955.

Descriptors: (*Vulcanization, *Curing agents), (*Rubber coatings, Vulcanization), (*Electric wire, Rubber coatings), Synthetic rubber, Sulfides, Salts, Bismuth compounds, Lead compounds, Metalorganic compounds.
Identifiers: Bismuth dimethyl-dithiocarbamate, Lead dimethyl dithiocarbamate.

With the high temperature curing systems currently being used for the continuous vulcanization of rubber-covered wire, care should be exercised in selecting those accelerators most adaptable to the process. Investigation has shown that bismuth dimethyldithiocarbamate (BISMATE) and lead dimethyl dithiocarbamate (LEDATE) are of particular interest by virtue of their desirable temperature coefficients of vulcanization as measured from various stocks. These accelerators are apparently inactive until the higher continuous vulcanization temperatures are reached and then appear to function as stable compounds rather than dissociating into a complex system of free radicals. For the realistic evaluation of accelerators in CV compounds, equipment is required which will cure the stocks in open steam and at temperatures corresponding closely to those employed in the production equipment. (Author)
AD-656 384 HC$3.00 MF$0.65

AUTOGENOUS EXTRUSION,
Western Electric Co Inc Baltimore Md
A. N. Gray. 1967, 10p

Descriptors: (*Extrusion, Plastics), Machines, Operation, Conveyors, Heating.

The article discusses the extrusion of plastic without external aid in the form of heating or cooling the extruder during operation.
AD-656 387 HC$3.00 MF$0.65

CABLE SPLICING GOES MODERN,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 9A.
AD-656 411 HC$3.00 MF$0.65

EXTRUSION OF FAST CURING NEOPRENE WIRE AND CABLE COMPOUNDS,
Du Pont de Nemours (E I) and Co Wilmington Del Elastomers Div
O. L. Simmons, and C. E. McCormack. Dec 57, 20p
Annual Signal Corps Wire and Cable Symposium (6th) at Asbury Park, N. J., 3-5 Dec 57.

Descriptors: (*Synthetic rubber, *Extrusion), Aging (Materials), Rubber coatings, Electric wire, Electric cables, Vulcanization, Processing.

Considering the manufacture of neoprene covered wires and cables, it is readily evident that the curing operation presents opportunities for increased efficiency. Economies would result if it were possible to operate the continuous vulcanizing (CV) machines at higher speeds, and also if it were feasible to CV cure many of the large size cables currently being vulcanized by the more expensive lead press method. The first step in accomplishing this objective is the development of processing techniques which will permit the extrusion of very fast curing neoprene compounds. This paper presents information on attaining this objective. (Author)
AD-656 413 HC$3.00 MF$0.65

PRE-DISPERSED ACCELERATORS IN RUBBER COMPOUNDS,
Ware Chemical Corp Westport Conn
For primary bibliographic entry see Field 11J.
AD-656 415 HC$3.00 MF$0.65

THE EFFECT OF STOCK TEMPERATURE ON THE PHYSICAL PROPERTIES OF POLYTHENE COATINGS FOR WIRE,
Canadian Industries Ltd New Toronto (Ontario) Plastics Div
For primary bibliographic entry see Field 11C.
AD-656 417 HC$3.00 MF$0.65

TECHNIQUES FOR INSULATING WIRE AND CABLE WITH SILICONE RUBBER,
Dow Corning Corp Midland Mich
D. C. Youngs, D. J. Badamo, and M. N. Culver. 1957, 13p
Annual Wire and Cable Symposium (6th), Asbury Park, N. J. December 3, 4, 5, 1967.

Descriptors: (*Silicone plastics, Electric insulation), (*Rubber coatings, Extrusion), Electric cables, Electric wire, Manufacturing methods, Conveyors, Vulcanization, Tape wound construction.

A roller feed, together with a hat, makes an effective mechanical feed for silicone rubber extruders. Such a feed reduces the labor required in the extruding operation. A single flight, decreasing pitch screw with a compression ratio of about 3 to 1 seems to give best all-around results when extruding silicone rubbers. When insulating wire with silicone rubber and vulcanizing in a hot air vulcanizer, extrusion speeds can be increased greatly by preheating the conductor to 300 to 400F. Semi-vulcanized silicone rubber tape is an excellent material for insulating large size conductors, providing advantages over currently used taped constructions utilizing fully cured tapes. (Author)
AD-656 421 HC$3.00 MF$0.65

CONTROLLED PRESSURE (VALVE) EXTRUSION,
Bakelite Co New York
B. H. Maddock, H. J. Nalepa, and B. Zurkoff. 1957, 28p
Annual Wire and Cable Symposium (6th), Asbury Park, N. J., December 3-5, 1957.
Availability: Published in Unidentified journal.

Descriptors: (*Extrusion, Pressure), Thermoplastics, Performance (Engineering), Conveyors, Efficiency, Machines.

The development of controlled pressure (valve) extrusion provides the industry with a new and practical tool that substantially improves extruder performances. It enables fabricators to improve extrusion product quality and to maintain it at a commercially acceptable level at the top screw speed of which the machine is capable. The technique of valve extrusion is based on the fact that quality is improved by increasing the operating pressure in the extruder. Increasing the pressure increases the mixing efficiency of the screw. This results in improved thermal and mechanical homogeneity, which in turn is reflected in improved product quality. The principles of controlled pressure extrusion have been shown to apply to all thermoplastics.
AD-656 422 Not available from CFSTI.

THE EXTRUSION OF 'TEFLON' 100X PERFLUROCARBON RESIN: A NEW MELT EXTRUDABLE MATERIAL FOR WIRE INSULATION,
Du Pont de Nemours (E I) and Co Wilmington Del Polychemicals Dept
R. E. Stabler. 1957, 7p

Annual Wire and Cable Symposium (6th), Asbury Park, N. J., December 3-5, 1957.

Descriptors: (*Extrusion, *Halocarbon plastics), Electric insulation, Electric wire, Electrical properties, Physical properties, Plastic coatings, Electric cables.

'Teflon' 100X perfluorocarbon resin is a new melt-extrudable material. This paper discloses the electrical and physical properties of this resin. It also gives the extrusion conditions for processing 'Teflon' 100X into various constructions including jacketing of cables. (Author)
AD-656 423 HC$3.00 MF$0.65

FEASIBILITY STUDY OF THE FORMING OF DUCTILE IRON,
Frankford Arsenal Philadelphia Pa Ammunition Development and Engineering Labs
Duane O. Gustad. Jun 67, 31p
FA-R-1002

Descriptors: (*Metallurgy, *Iron), Microstructure, Ductility, Photomicrography, Forging, Drawing (Machine processing), Thickness, Rolling (Metallurgy), Tensile properties, Deformation, Ammunition components, Design, Feasibility studies.

The report presents the results of attempts to form cast Ductile Iron into ammunition components by common forming techniques. The forming techniques studied were hot forging, drawing and nosing. (Author)
AD-656 457 HC$3.00 MF$0.65

EVALUATION TESTS OF A LOW-SINTER-TEMPERATURE, CERAMIC METALIZING PROCESS.
Research and Development technical rept.,
Army Electronics Command Fort Monmouth N J
Stanley R. DuBuske. May 67, 20p Rept no. ECOM-2851

Descriptors: (*Ceramic materials, *Metalation), (*Electron tube parts, Metalation), Molybdenum compounds, Manganese compounds, Oxides, Manufacturing methods, Brazing, Seals, Tensile properties, Sintering, Soldering alloys, Binders.
Identifiers: Manganese dioxide, Molybdenum oxides.

A series of evaluation tests were made of a low-sinter-temperature, refractory-metal-oxides (MoO_3/MnO_2) ceramic metalizing suspension. The tests were made to determine what limitations, if any, exist for the application of the low-sinter-temperature (900C to 1100C) metalizing suspension for electron-tube fabrication. The metalizing suspension was found to be easy to handle, especially since ordinary brazing furnaces rather than special high-temperature sinter furnaces can be used for the sintering process. In addition, no overplating of the sintered-metalized ceramic surfaces was needed to produce high-strength, hermetic seals. The highest tensile strength, most reliable ceramic-to-ceramic and ceramic-to-metal seals were obtained when the maximum sinter temperature of 1100C was used in conjunction with the vacuum-tube grade solders OFHC copper, nickel-gold eutectic, and gold-copper eutectic. (Author)
AD-656 460 HC$3.00 MF$0.65

HOW TO PREDICT EXTRUDER PERFORMANCE,
Bakelite Co New York
For primary bibliographic entry see Field 13I.
AD-656 510 Not available from CFSTI.

A PRACTICAL APPROACH TO THE EXTRUSION OF THERMOPLASTICS,
Du Pont de Nemours (E I) and Co Wilmington Del Polychemicals Dept
Wallace Hooper. 1956, 25p
Annual Wire and Cable Symposium (5th), Asbury Park, N. J., December 6, 1956.

Descriptors: (*Extrusion, *Thermoplastics), Plastic coatings, Electric insulation, Conveyors, Helixes, Mathematical analysis, Operation.

The study produced a new understanding of, and quantitative expression for, the patterns of flow in an extruder. Further, it made it possible to develop a rational, practical system of extruder operation.
AD-656 514 HC$3.00 MF$0.65

THE EXTRUSION OF 'TEFLON' 6 TETRAFLUOROETHYLENE RESIN FOR WIRE INSULATION.
Du Pont de Nemours (E I) and Co Wilmington Del Polychemicals Dept
D. N. De Young, and G. R. Snelling. 1957, 29p

Descriptors: (*Halocarbon plastics, Extrusion), Electric wire, Electric insulation, Plastic coatings, Performance (Engineering).

The purpose of the study of 'Teflon' 6 extrusion, sometimes referred to as paste extrusion, for insulating wire with 'Teflon' was to determine the effect of each of the operating variables in the quality of the wire insulation. The die design, guide tip clearance, and the oven temperatures were found to be the most critical variables. For optimum machine performance the ram displacement rate and the wire speed should be controlled as accurately as possible. The extrusion process in its present stage of development is a suitable means for the commercial production of wire insulated with 'Teflon'. It enables the use of the excellent properties of the 'Teflon' insulated wire in many commercial applications. (Author)
AD-656 515 HC$3.00 MF$0.65

ELECTROSLAG REMELTING AND QUALITY OF METAL,
Foreign Technology Div Wright-Patterson AFB Ohio
S. A. Leibenzon. 24 Apr 67, 64p Rept no. FTD-MT-65-457
TT-67-62508
Edited machine trans. of mono. Elektroshlakovyi Pereplav i Kachestvo Metalla, Moscow, 1965 63p.

Descriptors: (*Steel industry, *Metallurgy), (*Slags, Furnaces), Steel, Vacuum, Liquid metals, Crystallization, Arc welding, Electrodes, USSR.

In pamphlet along with analysis of certain peculiarities of existing methods of increase of quality of steel, there is described a new progressive method of production of steel, developed in Ye. O. Paton Institute of electric welding and receiving the name of the process of electroslag remelting of consumable electrodes in a copper water-cooled casting mold. The process is introduced for the first time in USSR at 'Dneprospetsstal' electrometallurgical plant in Zaporozh'e. In pamphlet there is shown practical possibility of production of especially solid macrostructure and pure nonmetallic inclusions of high-quality steels with help of simple technology of process of electroslag remelting. (Author)
AD-656 561 HC$3.00 MF$0.65

PRODUCTION OF WELDED TUBES FROM TITANIUM AND ITS ALLOYS,
Foreign Technology Div Wright-Patterson AFB Ohio
F. E. Tretyakov, R. V. Golovkin, and V. Ya. Golberg. 11 May 67, 55p Rept no. FTD-MT-65-27
TT-67-62512
Edited machine trans. of mono. Proizvodstvo Svarnykh Trub iz Titana i ego Splavov, Moscow, 1964 54p.

Descriptors: (*Arc welding, *Titanium alloys), (*Pipes, Arc welding), Argon, Titanium, Ultrasonic welding, Helium group gases, Annealing, Welding, Industrial equipment, USSR.

The technology of the industrial process of the manufacture of welded straight-seam tubes from titanium and its alloys is presented; the essence of two new processes for the production of tubes from titanium - argon-arc and high-frequency welding - is shown. The construction of units for preparation of strip in the flow of tube-welding machine, protective chamber, and semiautomatic welding torch is indicated. Special features of transfer equipment, welding devices, and tools used during the production of titanium tubes by argon-arc and high-frequency welding are noted. The results of investigations of properties of welded titanium tubes and the technical and economic indices of production are given. The prospects for application of the new methods of producing titanium tubes in factories of the USSR are presented. The booklet is intended for engineering and technical workers and skilled workers of plants engaged in the production and application of titanium tubes. The materials presented in the pamphlet can be used by design organizations and by students of technical colleges and technical schools. (Author)
AD-656 566 HC$3.00 MF$0.65

MACHINING DATA FOR NUMERICAL CONTROL PERIPHERAL END MILLING,
Metcut Research Associates, Inc., Cincinnati, Ohio.
Michael Field, Clarence L. Mehl, and John F. Kahles. Sep 66, 41p
AFMDC-66-1.4
Contract AF 33 (165)-5262

Descriptors: (*Machining, Tables), Heat-resistant metals + alloys, Stainless steel, Titanium alloys, Machine tools, Cutting fluids, Steel, Costs, Milling machines, Cutting, Refractory metal alloys.

The report presents an extensive set of machining data selected from six USAF Machinability Reports. Data are tabulated and arranged in formats including machining variables such as tool material, tool geometry, cutting fluid, depth, feed, and tool life end point. For each of the data lines, the relationship between tool life and cutting speed is expressed in at least three sets of data, thereby making it possible to optimize for maximum production or minimum cost. While these data are expected to be of considerable assistance in providing data for numerical control applications, they are also of great value in any type of machining situation involving the materials for which machining data are presented. Specifically this report, the fourth of a series, pertains to peripheral end milling. (Author)
AD-800 227 HC$3.00 MF$0.65

MACHINING DATA FOR NUMERICAL CONTROL END MILL SLOTTING,
Metcut Research Associates, Inc., Cincinnati, Ohio.
Michael Field, Clarence L. Mehl, and John F. Kahles. Sep 66, 55p
AFMDC-66-1.5
Contract AF 33 (615)-5262

Descriptors: (*Machining, Tables), Heat-resistant metals + alloys, Titanium alloys, Stainless steel, Machine tools, Refractory metal alloys, Cutting fluids, Steel, Costs, Microstructure, Cutting.

The report presents an extensive set of machining data selected from six USAF Machinability Reports. Data are tabulated and arranged in formats including machining variables such as tool material, tool geometry, cutting fluid, depth, width, feed, and tool life end point. For each of the data lines, the relationship between tool life and cutting speed is expressed in at least three sets of data, thereby making it possible to optimize for maximum pro-

duction or minimum cost. While these data are expected to be of considerable assistance in providing data for numerical control applications, they are also of great value in any type of machining situation involving the materials for which machining data are presented. Specifically, this report, the fifth of a series, pertains to end mill slotting. (Author)
AD-800 228 HC$3.00 MF$0.65

MACHINING DATA FOR NUMERICAL CONTROL TAPPING,
Metcut Research Associates, Inc., Cincinnati, Ohio.
Michael Field, Clarence L. Mehl, and John F. Kahles. Nov 66, 34p
AFMDC-66-1.6
Contract AF 33 (615)-5262

Descriptors: (*Machining, Tables), Heat-resistant metals + alloys, Stainless steel, Titanium alloys, Machine tools, Cutting fluids, Steel, Costs, Cutting, Microstructure, Refractory metal alloys.

The report presents an extensive set of machining data selected from six USAF Machinability Reports. Data are tabulated and arranged in formats including machining variables such as tool material, tool geometry, cutting fluid, depth, feed, and tool life end point. For each of the data lines, the relationship between tool life and cutting speed is expressed in at least three sets of data, thereby making it possible to optimize for maximum production or minimum cost. While these data are expected to be of considerable assistance in providing data for numerical control applications, they are also of great value in any type of machining situation involving the materials for which machining data are presented. Specifically, this report, the sixth of a series, pertains to tapping. (Author)
AD-803 041 HC$3.00 MF$0.65

MACHINING DATA FOR NUMERICAL CONTROL REAMING,
Metcut Research Associates, Inc., Cincinnati, Ohio.
Michael Field, Clarence L. Mehl, and John F. Kahles. Nov 66, 36p
AFMDC-66-1.7
Contract AF 33 (615)-5262

Descriptors: (*Machining, Tables), Reamers, Cutting fluids, Microstructure, Titanium alloys, Machine tools, Stainless steel, Refractory metal alloys, Steel, Heat-resistant metals + alloys.

The report presents an extensive set of machining data selected from six USAF Machinability Reports. Data are tabulated and arranged in formats including machining variables such as tool material, tool geometry, cutting fluid, depth, feed, and tool life end point. For each of the data lines, the relationship between tool life and cutting speed is expressed in at least three sets of data, thereby making it possible to optimize for maximum production or minimum cost. While these data are expected to be of considerable assistance in providing data for numerical control applications, they are also of great value in any type of machining situation involving the materials for which machining data are presented. Specifically, this report, the last of a series, pertains to reaming. (Author)
AD-803 042 HC$3.00 MF$0.65

MACHINING DATA FOR NUMERICAL CONTROL,
Metcut Research Associates, Inc., Cincinnati, Ohio.
Michael Field, Clarence L. Mehl, and John F. Kahles. Dec 66, 272p
AFMDC-66-1
Contract AF 33 (615)-5262

Descriptors: (*Machining, Tables), Drilling, Reamers, Stainless steel, Titanium alloys, Nickel alloys, Hardening, Machine tools, Cutting fluids, Refractory metal alloys, Heat-resistant metals + alloys, Alloys, Microstructure, Hardness, Cobalt alloys, High-temperature research.

The report presents an extensive set of machining data selected from six USAF Machinability Reports. Data are tabulated and arranged in formats including machining variables such as tool materials, tool geometry, cutting fluid, depth, width, feed, and tool life end point. For each of the data lines, the relationship between tool life and cutting speed is expressed in at least three sets of data, thereby making it possible to optimize for maximum production or minimum cost. While these data are expected to be of considerable assistance in providing data for numerical control applications, they are also of great value in any type of machining situation involving the materials for which machining data are presented. This report covers: Turning, Face Milling, Drilling, Peripheral End Milling, End Mill Slotting, Tapping, and Reaming. (Author)
AD-803 763 HC$3.00 MF$0.65

MARKING OF JEWELRY AND NOVELTIES OF SILVER.
National Bureau of Standards, Washington, D. C. 15 Aug 44, 6p
A voluntary standard.

Descriptors: (*Silver, Labels), (*Labels, *Standards), Silver alloys, Castings, Specifications.

This standard covers the marking of silver articles commonly or commercially known as jewelry or novelties (other than flatware, hollowware and toilet ware) offered for sale in the United States.
CS-118-44 HC$3.00

STEEL FENCE POSTS-FIELD AND LINE TYPE,
National Bureau of Standards, Washington, D. C. Edwin W. Ely. 1951, 8p
A voluntary standard.

Descriptors: (*Rods, *Standards), Quality control, Tolerances (Mechanics), Steel, Specifications.

The purpose of this commercial standard for steel fence posts is to establish an attainable standard of quality, as well as recognized standard sections, and sizes and manufacturing tolerances considered standard for the industry; and to provide effective designation of form, size, and properties as a basis of common understanding between manufacturers, distributors, and users of steel fence posts. The standard provides specifications for form, dimensions, weights, finish, and industry practices for steel fence posts of field and line type which currently are in general use and demand.
CS-184-51 HC$3.00

COLD MOLECULAR WELDING STUDY FINAL REPORT, JUN. 15, 1966 - JUN. 14, 1967.
Midwest Research Inst., Kansas City, Mo.
C. E. Moeller, and M. Noland. 14 Jan 67, 15p
NASA-CR-65661
Contract NAS9-3623

Descriptors: *Metal surface, *Stainless steel, *Welding, Atmosphere, Beryllium, Cold, Contact, Copper, Friction, Metal, Molecular, Plate, Stainless, Static, Steel, Surface, Time, Vacuum, Wear.

For abstract, see STAR 05 18.
N67-31501 HC$3.00 MF$0.65

THE RESULTS OF ULTRASONIC TESTING IN THE PRACTICE OF MACHINE AND BOILER CONSTRUCTION CONCERNING THE MATERIAL AND STRENGTH PROPERTIES OF COMPONENTS,
Division of Technical Information Extension (AEC), Oak Ridge, Tenn.
Hans Juergen Meyer. 1965, 222p
TT-67-62468
Trans. of Technische Hochschule, Darmstadt. Dissertation (West Germany) (17) 1965 209p.

Descriptors: (*Boilers, Ultrasonic radiation), (*Machines, Construction), Materials, Tensile properties, Mechanical engineering, Steel, Sulfur.

For abstract, see NSA 21 15.
ORNL-TR-1369 HC$3.00 MF$0.65

EPOXY BONDED AGGREGATES AS A SHEAR CONNECTING MEDIUM IN COMPOSITE BEAM CONSTRUCTION,
California State Div. of Highways. Bridge Dept.
For primary bibliographic entry see Field 13M.
PB-175 647 HC$3.00 MF$0.65

PACKAGING PRACTICE RECOMMENDATION. PACKAGING OF STANDARD MALLEABLE IRON SCREWED PIPE FITTINGS, BLACK OR GALVANIZED (FOR 2-INCH PIPE SIZE AND UNDER),
National Bureau of Standards, Washington, D. C. Edwin W. Ely. 1 Apr 52, 8p
A voluntary standard.

Descriptors: (*Pipe fittings, Packaging), (*Packaging, *Standards), Quality control, Pipe fittings, Steel, Specifications.

It is the purpose of the recommendation to establish a simplified schedule of standard quantities per unit package for the pipe fittings. The recommendation covers packaging of standard malleable iron screwed pipe fittings, black or galvanized finish, for 2-inch pipe size and under, and having a 150-pound steam working pressure.
SPR-248-52 HC$3.00

CORRECTING FORM ERRORS IN NUMERICALLY CONTROLLED MACHINED, POINT-DEFINED, SURFACES OF REVOLUTION,
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
F. H. Broome, and P. J. Anderson. 15 May 67, 14p
Contract W-7405-eng-26

Descriptors: (*Bodies of revolution, Surfaces), (*Errors, Corrections), Programming (Computers), Machining.

For abstract, see NSA 21 15.
Y-1576 HC$3.00 MF$0.65

AUTOMATIC TOOL SETTING FOR NUMERICALLY CONTROLLED MACHINES,
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
K. B. Reedy. 22 May 67, 25p
Contract W-7405-eng-26

Descriptors: (*Machines, Control systems), Cutting tools, Automatic, Machining, Spare parts, Design, Operation, Diagrams, Accuracy, Detection.

For abstract, see NSA 21 15.
Y-1579 HC$3.00 MF$0.65

13I. Machinery and Tools

ORDNANCE ENGINEERING DESIGN HANDBOOK: SERVOMECHANISMS. SECTION 1: THEORY, CONSISTING OF CHAPTERS 1-10.
Office of the Chief of Ordnance Washington D C
For primary bibliographic entry see Field 19D.
AD-655 861 HC$3.00 MF$0.65

ORDNANCE ENGINEERING DESIGN HANDBOOK: SERVOMECHANISMS. SECTION 2: MEASUREMENT AND SIGNAL CONVERTERS, CONSISTING OF CHAPTERS 11-12.
Office of the Chief of Ordnance Washington D C
For primary bibliographic entry see Field 19D.
AD-655 862 HC$3.00 MF$0.65

ORDNANCE ENGINEERING DESIGN HANDBOOK: SERVOMECHANISMS. SECTION 3: AMPLIFICATION, CONSISTING OF CHAPTER 13.
Office of the Chief of Ordnance Washington D C
For primary bibliographic entry see Field 19D.
AD-655 863 HC$3.00 MF$0.65

ORDNANCE ENGINEERING DESIGN HANDBOOK: SERVOMECHANISMS. SECTION 4: POWER ELEMENTS AND SYSTEM DESIGN, CONSISTING OF CHAPTERS 14-20.
Office of the Chief of Ordnance Washington D C
For primary bibliographic entry see Field 19D.
AD-655 899 HC$3.00 MF$0.65

AN AUTOMATIC THREE-DIMENSIONAL MODELS MEASURING MACHINE IN R.A.E. WORKSHOPS.
Technical rept.,
Royal Aircraft Establishment Farnborough (England)
W. G. Bushell, S. W. Potter, and E. H. A. Fewkes.
Jul 66, 25p Rept no. RAE-TR-66229

Descriptors: (*Machines, Measurement), (*Aircraft industry, *Great Britain), Maintenance, Design, Accuracy, Measurement, Gas bearings, Mechanical drawings, Photographs, Control systems.

The introduction of numerical control into the Inspection of Aircraft Models by the development of a special measuring machine. A description is given of its construction, the system for controlling precise movements, the method of output information and the method of operation. The considerable reduction in the time for measuring the contour of a model on a predetermined grid pattern is recorded in the form of examples. Improvements subsequently incorporated in the machine together with suggestions for further development are recorded. (Author)
AD-656 140 HC$3.00 MF$0.65

PRODUCTION BY AUTOGENOUS EXTRUSION,
Western Electric Co Inc Baltimore Md
For primary bibliographic entry see Field 13H.
AD-656 188 HC$3.00 MF$0.65

THE DESIGN OF DIES FOR HIGH-SPEED WIRE COATING,
Tennessee Eastman Co Kingsport
L. R. Hammond. 1959, 15p
Annual Wire and Cable Symposium (8th), Asbury Park, N. J., December 1-3, 1959.

Descriptors: (*Dies, *Plastic coatings), Electric wire, Design, Extrusion, Polyethylene plastics.

It was shown experimentally that the critical shear rate was increased by using smaller taper angles in the flow channel and by improving the flow properties. Improved flow properties can also be obtained by using a higher melt index resin or higher melt temperatures. It was shown that there was an optimum land length, and in this case the ratio of land length to orifice diameter was 11.34. Further work is being done to determine if the same ratio holds for different orifice sizes and if small tapers just prior to the land affect the land length. Thus, for a particular polyethylene, a die or high-speed wire coating can be designed successfully by giving proper consideration to the programming of the rate of increase in shear rate, the effect of the angles and lengths of the tapers, and the ratio of the land length to the orifice diameter. (Author)
AD-656 238 HC$3.00 MF$0.65

AUTOGENOUS EXTRUSION,
Western Electric Co Inc Baltimore Md
For primary bibliographic entry see Field 13H.
AD-656 387 HC$3.00 MF$0.65

SHAKE TABLE TESTS OF A SPIRAL-GROOVED JOURNAL BEARING.
Technical rept.,
Mechanical Technology Inc Latham N Y
S. B. Malanoski. Feb 67, 29p Rept no. MTI-66TR51
Contract Nonr-3730 (00)

Descriptors: (*Journal bearings, *Gas bearings), Sensors, Weight, Instrumentation, Vibration, Rotation, Velocity, Accelerometers, Temperature, Theory.

A 1.5 inch diameter, L/D = 1, spiral-grooved, gas journal bearing with a rotor weight of 2-1/8 lb. per bearing, mounted in a housing (total weight of approximately 100 lb.) was subjected to a one g vibrating load over a frequency spectrum of 20 to 2000 cps. Tests were made at rotor speeds of 12,000, 20,000 and 30,000 rpm. The only static bearing load imposed was the rotor weight. The in-line and perpendicular frequency responses of the rotor (both magnitude and phase angle) were measured and recorded. No sign of bearing touchdown was detected. Correlation between this experimental data and available theoretical data was good. (Author)
AD-656 398 HC$3.00 MF$0.65

CABLE SPLICING GOES MODERN,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 9A.
AD-656 411 HC$3.00 MF$0.65

HOW TO PREDICT EXTRUDER PERFORMANCE,
Bakelite Co New York
B. H. Maddock. 1956, 27p
Annual Wire and Cable Symposium (5th), Asbury Park, N. J., December 4-6, 1956.
Availability: Published in unidentified journal.

Descriptors: (*Machines, *Extrusion), Performance (Engineering), Predictions, Dies, Conveyors, Plastics, Operation.

Theoretical flow and screw design equations are shown to apply very well in extrusion of polyethylene with metering type screws when the terms 'effective resin viscosity' and 'effective screw length' are properly interpreted. The effective viscosity of polyethylene is a function of the rate of shear in the channel or orifice through which the resin is flowing and data on this property are presented. Since the rate of shear in the screw channel may be widely different in magnitude from that in the die (usually lower), the two areas must be treated independently. Procedures are outlined which define the delivery characteristics of an extruder at a specified resin temperature without reference to the manner in which this temperature is produced, or to the variables in screw design and operating conditions which may affect the temperature. They also cover what has been called a normal condition of operation, that is, a neutral or uncontrolled screw in which the heating and fluxing capacity of the compression section is equal to the pumping capacity of the metering section. The procedures are useful in predicting the performance of existing equipment and in the design of screws and dies for specific applications.
AD-656 510 Not available from CFSTI.

ALUMINUM SHEATHING PRESS,
General Cable Corp New York
Oscar G. Garner. Dec 56, 20p
Annual Wire and Cable Symposium (5th) at Asbury Park, N. J., 4-6 Dec 56.

Descriptors: (*Presses (Machinery), *Aluminum coatings), Electric cables, Extrusion, Dies, Cooling.

Certain unusual developments that have contributed to the success of making this machine a practical and efficient tool for the direct extrusion of aluminum sheath on insulated electrical cables have been stressed. The most interesting developments from the cable users' and manufacturers' point of view are: (1) The efficient cooling system to protect the cable insulation while it is in the die block. This feature permits the extrusion at relatively high temperature and low pressures. (2) The 'ratchet spanner' arrangement for the control of sheath wall thickness. (3) The 'tapered-heating' and progressive 'upsetting' of billets displacing air from the containers and preventing formation of blisters in the sheath. (4) The synchronization and equalization control of the advance of the rams during the extrusion of the aluminum sheath. (Author)
AD-656 519 HC$3.00 MF$0.65

RAIL IMPACT TESTING ON LONG TRAVEL SHOCK MOUNTS, MODELS 230 AND 570.
Army Transportation Engineering Agency Fort Eustis Va
For primary bibliographic entry see Field 13F.
AD-656 600 HC$3.00 MF$0.65

FINITE WIDTH EFFECTS ON THE SELF ACTING FOIL BEARING.
Interim rept.,
Columbia Univ., New York. Lubrication Research Lab.
A. Eshel, and H. G. Elrod. Aug 66, 120p Rept. no. TR-6
Contract Nonr-4259 (14)

Descriptors: (*Bearings, Foils), Antifriction bearings, Partial differential equations, Approximation (Mathematics), Programming (Computers), Magnetic tape, Lubrication, Reynolds number, Tapes, Differential equations, Numerical analysis, Mathematical models, Pressure, Performance (Engineering), Fluid dynamic properties, Elastic shells.

Side leakage effects on the foil bearing are investigated in the report. First the applicable differential equations are formulated and then two models are studied. Solution for the edge profile of the axisymmetrical foil bearing with a source at 'infinity' is obtained. In addition, the case of the axisymmetrical foil bearing on the verge of contact is analytically solved. That region of the self acting foil bearing in which the longitudinal pressure flow term of the Reynold's equation is negligible, is studied by means of a quasi axisymmetry approximation.
AD-802 009 HC$3.00 MF$0.65

EFFECT AND CONTROL OF CHATTER VIBRATION IN MACHINE TOOL PROCESSES QUARTERLY TECHNICAL REPORT, 1 AUG. - 31 OCT. 1966.
Technische Hochschule Munchen (West Germany). Institut Fuer Werkzeugmaschinen Und Betriebswissenschaften.
K. Corbach, H. Dirmeier, H. Dzaack, and S. Satyamurty. 30 Nov 66, 37p QTR-2, AD-652494
Contract AF 61/052/-961

Descriptors: *Dynamic property, *Machine tool, *Transfer function, *Vibration testing, Analog, Computer, Cutting, Dynamic, Electronic, Excita-

tion, Function, Gear, Machine, Measurement, Performance, Property, Rig, Rotation, Stability, Stiffness, Testing, Tool, Torque, Transducer, Transfer, Vibration.

For abstract, see STAR 05 18.
N67-31548 HC$3.00 MF$0.65

EXPERIMENTS WITH HYDRODYNAMIC JOURNAL BEARINGS OF VARIOUS MATERIALS AND DESIGNS IN SODIUM AT TEMPERATURES TO 800 DEG F.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
W. J. Anderson, Z. Nemeth, and F. T. Schuller. 1967, 35p NASA-TM-X-52247
To Be Presented At the Lubrication Conf., Chicago, 17-19 Oct. 1967 Revised

Descriptors: *Alkali metal, *Journal bearing, *Liquid sodium, Alkali, Alloy, Bearing, Carbide, Cermet, Cobalt, Design, Experiment, Film, High temperature, Hydrodynamics, Journal, Liquid, Load, Lubrication, Material, Metal, Nickel, Seizure, Sodium, Speed, Test, Titanium, Wear.

For abstract, see STAR 05 18.
N67-31966 HC$3.00 MF$0.65

THE RESULTS OF ULTRASONIC TESTING IN THE PRACTICE OF MACHINE AND BOILER CONSTRUCTION CONCERNING THE MATERIAL AND STRENGTH PROPERTIES OF COMPONENTS,
Division of Technical Information Extension (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 13H.
For abstract, see NSA 21 15.
ORNL-TR-1369 HC$3.00 MF$0.65

13J. Marine Engineering

THE DESIGN OF TANKS FOR USE IN AN ACTIVE TANK SYSTEM.
Hydronautics Inc Laurel Md
For primary bibliographic entry see Field 20D.
AD-655 866 HC$3.00 MF$0.65

HYDRODYNAMIC FORCES ON AN ANCHOR CABLE,
David Taylor Model Basin Washington D C
L. Landweber. Nov 47, 14p Rept no. DTMB-317

Descriptors: (*Cables (Mechanical), *Hydrodynamics), (*Anchors (Marine), Cables (Mechanical)), Ships, Force (Mechanics), Drag.

The holding power required of an anchor for a ship anchored in shoal water with a length of anchor line at least five times the water depth, i.e., with a scope of five, can normally be assumed to be equal to the estimated drag of the ship. Anchoring in deep water necessitates a relatively shorter anchor line, which results in a considerable hydrodynamic force on the anchor cable and a tension in the cable much greater than the drag of the ship. Curves were computed from which the magnitude and direction of the tensions in the anchor cable can be determined when the drag of the ship, the velocity of the current, the depth of the water, and the type and length of the anchor cable are known. Formulas are given for ship drag, current parameter, breaking strength of wire-rope and chain cables, safe working loads on cables, and holding power of an anchor. An illustrative example applies these calculations to the determination of diameter and length of a wire-rope anchor cable and of size of anchor required in a given problem. (Author)
AD-655 959 HC$3.00 MF$0.65

OPERATION OF A SWIMMING CATAMARAN AND NATURE'S CHALLENGE,
Bowlus (Glenn H) Laguna Hills Calif
Glenn H. Bowlus. 15 Jan 67, 30p
Contract N60530-10045

Descriptors: (*Catamarans, Flexible structures), (*Marine propulsion, Catamarans), Swimming, Simulation, Bionics, Ship hulls, Design, Ship noise, Turbulent boundary layer, Propeller noise, Tests, Submarines, Theory, Floats.
Identifiers: Swimming catamarans.

High performance of fast swimming sea animals challenges naval designers to provide undulating flexible hulls instead of conventional rigid ships driven by propellers. Nature's method of self-locomotion assures silence as well as economy provided the barrier of complete flexibility is surmounted by modern technology in a practical manner. Nature's challenge, as shown by the swimming vehicle, is a 'structural approach' to noise reduction by eliminating the propeller. Experiments with the swimming vehicle show an improvement in boundary-layer conditions, as found in nature, by wiping away the turbulent body wake. Tests of the swimming catamaran were documented with respect to speed and other parameters, but the slow speeds attained due to low power are not significant nor inherent in the swimming method. (Author)
AD-656 035 HC$3.00 MF$0.65

INVESTIGATION OF THE TIME DEPENDENT WAKE MEASURED ON A SUBMARINE BODY.
Final rept.,
Littleton Research and Engineering Corp Mass
F. Everett Reed, William T. Hogan, Arun K. Trikha, and Ronald G. Orner. Oct 66, 55p Rept no. G-132-1
Contract N00014-66-C-0033

Descriptors: (*Submarines, *Wake), Boundary layer, Turbulence, Velocity, Submarine hulls, Partial differential equations.

Data on velocity fluctuations in the boundary layer on a submarine were collected and investigated. The report determines a response function for the pitot tube measuring system employed on the submarine and uses it in the analysis of some of the data. Scale and intensity of the turbulence is investigated. Velocity fluctuations within the boundary layer are found to be random with no apparent periodicity at frequencies capable of detection by the measuring system. Limitations in the determination of turbulence from the submarine data are discussed. (Author)
AD-656 055 HC$3.00 MF$0.65

SILICONE INSULATED CABLES FOR NAVAL MARINE APPLICATION,
New York Naval Shipyard Brooklyn Material Lab
For primary bibliographic entry see Field 9A.
AD-656 080 HC$3.00 MF$0.65

WIRES AND CABLES FOR SUBMARINE RADIO SYSTEMS.
Navy Underwater Sound Lab New London Conn
For primary bibliographic entry see Field 9A.
AD-656 176 HC$3.00 MF$0.65

DEVELOPMENTS IN SUBMARINE COMMUNICATION CABLES,
Simplex Wire and Cable Co Cambridge Mass
For primary bibliographic entry see Field 9A.
AD-656 386 HC$3.00 MF$0.65

NCEL OCEAN ENGINEERING PROGRAM, MARCH 1966-MARCH 1967.
Naval Civil Engineering Lab Port Hueneme Calif
1967, 53p

Descriptors: (*Marine engineering, *Oceans), Manpower, Physics laboratories, Underwater lights, Construction, Deep submergence, Underwater equipment, Floats, Ocean bottom sampling, Sedimentation, Steel, Corrosion, Anchors (Marine), Protective treatments, Degradation.

Ocean engineering will provide man with the native urge for exploration and acquisition, and to observe and perform those functions he considers necessary to complete his mission. Some explorations will be at diver depths and will expose man directly to the undersea environment. These methods of exploration are distinctly different, and yet they complement one another because they impose similar demands on technology and issue a challenge to the many disciplines of engineering and science. The publication documents the efforts and research undertaken by the Naval Civil Engineering Laboratory in answer to this challenge. The period covered is, roughly, from March 1966 to March 1967, although the techniques described are results of work much deeper in the past, and the technology envisioned represents a long stride into the future. (Author)
AD-656 453 HC$3.00 MF$0.65

THEORETICAL SOLUTIONS AND NUMERICAL RESULTS FOR LOW-ASPECT-RATIO RECTANGULAR JET-FLAP CONTROL SURFACES.
Final rept. Oct 65-Oct 66,
Therm Advanced Research Inc Ithaca N Y
John C. Erickson, Jr., and Alvin L. Kaskel. Dec 66, 66p Rept no. TAR-TR-6603
Contract Nonr-5148 (00)

Descriptors: (*Submarines, Control surfaces), (*Control surfaces, Jet flaps), Aspect ratio, Numerical analysis, Lift, Momentum, Angle of attack, Rectangular bodies, Maneuverability.

The lifting problem of a finite-aspect-ratio, thin, jet-flap control surface of rectangular planform in unbounded, incompressible, subcavitating flow is considered in the improved low-aspect-ratio approximation of H. R. Lawrence. A general method of numerical solution is derived for any regular or singular blowing jet-flap geometry. Numerical solutions are carried out for the following specific configurations: regular blowing from a flat plate at angle of attack; regular blowing over deflected mechanical flaps of ten and twenty percent chord; and singular blowing from a flat plate at zero angle of attack. Tables and curves of the computed lift and pitching-moment coefficients and chordwise load distributions for these configurations are presented over a wide range of the governing parameters. (Author)
AD-656 491 HC$3.00 MF$0.65

SUBMARINE CABLE ACTIVITIES,
Navy Electronics Lab San Diego Calif
Guy V. Williams. Dec 56, 47p
Annual Wire and Cable Symposium (5th) at Asbury Park, N. J., 4-6 Dec 56.

Descriptors: (*Minelayers, *Landing craft), Minelaying, Electric cables, Underwater, Operation.

The LCU (6) type hull lends itself particularly well to conversion into a harbor defense vessel. The conversion may be made for a cost of approximately $175,000. The vessel has a design capability of laying one nautical mile of a completed cable system per day. The vessel can be successfully utilized as a mine planter. The vessel has a maximum cable storage capacity of 80 tons, and can handle sea units up to 5 tons in weight. Fifteen people are required to operate the vessel and her specialized equipment. Dockside and sea trials have verified design operational requirements. Approximately 1,000,000 feet of submarine cable has been handled by the vessel during the first eight months of operation following her conversion, without a single failure of her cable machinery. The conversion has resulted in a self-supporting unit capable of independent submarine-cable-

laying and maintenance operations in addition to a wide variety of other tasks requiring specialized equipment. Additional deck space may be created by splicing in part of a hull section from another similar LCU. The lengthening of the hull will make little or no difference in performance of the vessel. The vessel may be readily transported to any desired forward area or advanced base, by loading her into the dock-well of a Landing Ship Dock (LSD).
AD-656 507 HC$3.00 MF$0.65

DEVELOPMENT OF A CONDITION OF MAINTENANCE RATING SCALE AND SAMPLING PROCEDURES FOR BUILDINGS OF THE NAVAL SHORE ESTABLISHMENT.
Battelle Memorial Inst Columbus Ohio
For primary bibliographic entry see Field 13M.
AD-656 584 HC$3.00 MF$0.65

ANALYSIS OF ESTIMATED RIVER EXITING PERFORMANCE.
Technical rept.,
Detroit Univ Mich Dept of Civil Engineering
D. A. Sloss, W. J. Baker, D. M. Lassaline, and C. X. C. F. Miranda. Jul 67, 72p
ATAC-TR-9689, LL-115
Contract DA-20-113-AMC-09099 (T)

Descriptors: (*Amphibious vehicles, Performance (Engineering)), (*Rivers, Terrain), Soil mechanics, Analysis, Maneuverability, Probability, Numerical methods and procedures, Geometric forms, Armored vehicles, Passenger vehicles.
Identifiers: M-113 vehicles.

A previous study of river magnitude and frequency established river exiting as the primary problem for vehicles attempting to cross rivers. Analysis of the exiting problem indicated that the single most important parameter to be considered was the geometric form of the river bank. Evaluation of the probability of an M-113 exiting at each bank surveyed in the magnitude and frequency study was made by relating vehicle performance characteristics to bank descriptions; a determination of the probability of the vehicle exiting was then made on a GO or NO-GO basis. Since much of the environment was extremely severe with respect to M-113 capabilities, this evaluation was fairly straightforward. A numerical method, using a geometric severity to classify bank geometry, was then developed to permit a performance analysis to be conducted on a rational basis. (Author)
AD-656 607 HC$3.00 MF$0.65

BUCKLING OF VESSELS COMPOSED OF COMBINATIONS OF CYLINDRICAL AND SPHERICAL SHELLS.
Technical rept.,
Weidlinger (Paul) New York
Azriel Harari, and Melvin L. Baron. Jul 67, 50p
Rept no. TR-7
Contract Nonr-3454 (00)

Descriptors: (*Structural shells, Buckling (Mechanics)), (*Underwater vehicles, Deep submergence), Cylindrical bodies, Spheres, Equations, Hemispherical shells.

The overall buckling of unstiffened cylindrical shells with hemispherical end caps is studied. Numerical results for the buckling load parameter are obtained in terms of the parameters h/a, L/a and n. The theoretical results are compared with a series of experimental results; excellent agreement between theory and experiment is noted. (Author)
AD-656 639 HC$3.00 MF$0.65

GRILLAGES UNDER NORMAL AND AXIAL LOADS - PRESENT STATUS,
Lehigh Univ Bethlehem Pa Fritz Engineering Lab
Robert P. Kerfoot, and Alexis Ostapenko. Jun 67, 184p Rept no. 323.1
Contract NObs-94238

Descriptors: (*Ship hulls, Loading (Mechanics)), Beams (Structural), Ship plates, Design, Bending, Integral equations, Elasticity, Analysis, Force (Mechanics), Stresses.
Identifiers: Grillages.

The report presents the results of a survey of the literature dealing with the analysis and design of grillages under normal and axial loads. The requirements of a rigorous design procedure are outlined and compared with the strongly empirical approaches currently employed. The following methods of analysis applicable to grillage structures are discussed: the differential and integral equation and energy formulation in terms of plate and beam theories, the analysis of an equivalent orthotropic plate or beam grid, and the discrete element methods. The survey has shown that neither a completely satisfactory method for the working stress analysis nor a method for the ultimate strength analysis of grillages under combined normal and axial loads is yet available. It is suggested that one of the discrete element methods, either the lumped parameter or finite element approach, be adapted for both the working stress and ultimate strength analysis of grillages under combined loads. (Author)
AD-656 725 HC$3.00 MF$0.65

THE ADDED RESISTANCE OF SHIPS IN WAVES,
Massachusetts Inst. of Tech., Cambridge. Dept. of Naval Architecture and Marine Engineering.
Robert F. Beck. Jun 67, 77p Rept. no. 67-9
Contracts MA-2710, DSR-70098

Descriptors: (*Ships, Drag), Ocean waves, Linear systems, Model tests, Ship hulls, Motion.

Maruo's linear theory for the added resistance of a ship operating in head seas is placed into a form which allows numerical evaluation on a computer. To establish the validity of linear theory, a comparison is made between the predicted theoretical values of added resistance and the measured values obtained from experiments on a Mariner model and Series 60 models. The results of the comparison indicate that linear theory does predict the increment in resistance with a good degree of accuracy in the range of higher Froude numbers. Having demonstrated the usefulness of linear theory in predicting added resistance, a computer study is carried out to evaluate the added resistance of 'U' and 'V' shaped hull forms. The study shows that the V-form has 10 to 20% less added resistance than the U-form in the normal ship operating ranges. (Author)
PB-175 654 HC$3.00 MF$0.65

THE LIMITING HEIGHT OF OCEAN WAVES,
Massachusetts Inst. of Tech., Cambridge. Dept. of Naval Architecture and Marine Engineering.
F. H. Sellars. Jun 67, 42p Rept. no. 67-10
Contracts MA-2710, DSR-70098

Descriptors: (*Ocean waves, Hydrodynamics), (*Ships, Ocean waves), Mathematical models, Gravity.

A methematical model is formulated that treats the breaking of an irregular ocean wave. The boundary condition for breaking is taken to be that the downward particle acceleration at the wave crest is equal to that of gravity. Solutions are obtained for the case of constant steepness which is taken to be representative of the equilibrium range discussed by Phillips. The solutions indicate that a steepness greater than 1/7 is possible and that the steepness required for breaking decreases as the frequency bandwidth of component waves increases. Laboratory measurements of breaking waves are described. The experimental results give steepness greater than 1/7 in some cases and are found to vary with frequency bandwidth in a manner similar to that predicted by theory. (Author)
PB-175 655 HC$3.00 MF$0.65

13K. Pumps, Filters, Pipes, Fittings, Tubing, and Valves

AMC: A MONTE CARLO CODE UTILIZING THE ALBEDO APPROACH FOR CALCULATING NEUTRON AND CAPTURE GAMMA-RAY DISTRIBUTIONS IN RECTANGULAR CONCRETE DUCTS,
Oak Ridge National Lab Tenn
R. E. Maerker, and V. R. Cain. Aug 67, 129p
Rept no. ORNL-3964
Contract W-7405-eng-26

Descriptors: (*Ducts, *Concrete), (*Monte Carlo method, Coding), Programming (Computers), Gamma rays, Geometry, Dose rate, Neutrons, Programming languages, Problem solving, Fast neutrons.

The report describes the AMC code and is intended to serve as a reference manual to be used with the code. This code can be used to calculate the fluxes and dose rates inside large rectangular ducts constructed of concrete walls that arise from neutrons of all energies incident upon the duct mouth. An option in the code allows a simultaneous calculation of the secondary gamma-ray dose rates arising from wall capture as well. The code treats duct transmission by employing the albedo concept in conjunction with a Monte Carlo treatment of history generation. The present description is limited to six distinct types of rectangular duct geometries, but includes ducts having up to three legs with two right-angle bends.
AD-656 047 HC$3.00 MF$0.65

METHOD OF PUMPING OF VACUUM SYSTEMS,
Foreign Technology Div Wright-Patterson AFB Ohio
E. N. Martinson, and V. I. Plechev. 27 Feb 67, 6p Rept no. FTD-HT-67-17
Sposob Otkachki Vakuumnykh Sistem, unedited rough draft trans. of Patent (USSR) 164 920, appl. 809519/24-6, 21 Dec 62.

Descriptors: (*Vacuum pumps, *Vacuum seals), Helium group gases, Nitrogen, Sorption, Flush valves, USSR.

The article describes a method of pumping out vacuum systems with the aid of sorption pumps, which for the purpose of removing inert gases and attaining a higher vacuum, the system of periodically flushing out with gaseous nitrogen is used. (Author)
AD-656 564 HC$3.00 MF$0.65

DESIGN AND EXPERIMENTAL PERFORMANCE OF A SMALL CENTRIFUGAL PUMP FOR LIQUID HYDROGEN.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
M. J. Hartmann, G. W. Lewis, and E. R. Tysl. Sep 60, 29p NASA-TM-X-388

Descriptors: *Centrifugal pump, *Liquid hydrogen, *Performance characteristics, Blade, Centrifugal, Characteristics, Design, Filament, Hydrogen, Liquid, Low speed, Performance, Pump, Radial, Rotor, Stream.

For abstract, see STAR 05 18.
N67-31526 HC$3.00 MF$0.65

PACKAGING PRACTICE RECOMMENDATION. PACKAGING OF STANDARD MALLEABLE IRON SCREWED PIPE FITTINGS, BLACK OR GALVANIZED (FOR 2-INCH PIPE SIZE AND UNDER),

National Bureau of Standards, Washington, D. C.
For primary bibliographic entry see Field 13H.
SPR-248-52 HC$3.00

13L. Safety Engineering

INVESTIGATION OF SENSITIVITY OF FERTILIZER GRADE AMMONIUM NITRATE TO EXPLOSION.
Picatinny Arsenal Dover N J
For primary bibliographic entry see Field 19D.
AD-655 888 HC$3.00 MF$0.65

RADIOLOGICAL SAFETY INSTRUCTIONS FOR THE LANE-WELLS NUCLEAR SEDIMENT DENSITY METER.
Naval Oceanographic Office Washington D C
For primary bibliographic entry see Field 18D.
AD-656 083 HC$3.00 MF$0.65

OIL CONTAMINATION IN OXYGEN SYSTEMS.
Final rept. Jul 66-May 67,
General Dynamics Corp Groton Conn Electric Boat Div
John B. Presti, and Charles J. DeSimone, Jr. 16 Jun 67, 68p Rept no. U413-67-101
Contract NObs-94416

Descriptors: (*Oxygen equipment, *Fire safety), (*Oils, *Ignition), Oxygen, Contamination, Lubricants, Cutting fluids, Hydrocarbons, Pipes, Standards, Cleaning, Controlled atmospheres.

A test program was conducted to determine the ignition limits of oil contamination in 1/2 in. monel pipe when pressurized with 3000 psi oxygen. The oils investigated were 2190 lubricating oil and Habcool No. 318 cutting oil. The test results showed little danger of compression ignitions at oil concentrations below 160 mg./sq ft of 2190, or below 110 mg./sq ft for Habcool. Concentrations of both oils above 260 mg./sq ft will ignite when rapidly pressurized with 3000 psi oxygen. The results also showed that ignition will not occur with oil droplets or puddles smaller than 100 microl in size and that a pressure rise greater than 25% will not occur below oil concentrations of 500 mg./sq ft. As a result of this test program, it is recommended that the oxygen clean standards be relaxed to 1.5 mg./sq ft.
AD-656 126 HC$3.00 MF$0.65

CRASH SURVIVAL DESIGN GUIDE,
Aviation Safety Engineering and Research Phoenix Ariz
J. W. Turnbow, D. F. Carroll, J. L. Haley, Jr., W. H. Reed, and S. H. Robertson. Jul 67, 273p Rept no. AvSER-66-18
USAAVLABS-TR-67-22
Contract DA-44-177-AMC-360 (T)

Descriptors: (*Army aircraft, Design), (*Aviation accidents, Survival), Aviation safety, Aircraft seats, Safety harness, Aircraft cabins, Fire safety, Aircraft fires.

The report concerns the development of crashworthy U. S. Army aircraft. The guide presents in a condensed form the data, design techniques, and criteria which are presently available in eight areas: (1) Aircraft crash kinematic and survival envelopes; (2) airframe crashworthiness design criteria; (3) aircraft seat design criteria (crew and troop/passenger); (4) restraint system design criteria (crew, troop/passenger and cargo); (5) occupant environment design criteria; (6) aircraft ancillary equipment stowage design criteria; (7) emergency escape provisions; (8) postcrash fire design criteria. (Author)
AD-656 621 HC$3.00 MF$0.65

SALVAGE OF FIRE AND WATER DAMAGED RECORDS, SBA, MINNEAPOLIS, MINNESOTA.
Federal Fire Council Washington D C
For primary bibliographic entry see Field 5B.
AD-656 758 HC$3.00 MF$0.65

A REPRODUCIBLE SYSTEM FOR EVALUATING FOREST FIRE RETARDANTS.
Research paper,
Southern Forest Fire Lab., Macon, Ga.
R. W. Johansen. Apr 67, 11p
RP-SE-26

Descriptors: (*Forestry, *Fire safety), Effectiveness, Fire resistant materials, Wood, Chemicals, Ammonium compounds, Sulfates, Phosphates, Tests, Analysis.

A method for testing the effectiveness of fire-retardant chemicals on woody fuels has been developed. The test involves the use of a pre-constructed wood crib, one-half of which is treated with a fire retardant. The speed with which flames pass through the treated portion of the crib is plotted over the weight of dry chemical present. A regression curve is plotted for each chemical that reflects treatment effectiveness in accordance with amount of chemical present. The most effective chemical has the steepest curve. Of the chemicals tested, the best 'effectiveness' ratings belong to ammonium sulfamate, ammonium phosphates (DAP, MAP, and 11-37-0), and ammonium sulfate in that order. (Author)
PB-175 570 HC$3.00 MF$0.65

THE STATE OF THE ART OF TRAFFIC SAFETY. A CRITICAL REVIEW AND ANALYSIS OF THE TECHNICAL INFORMATION ON FACTORS AFFECTING TRAFFIC SAFETY. PART I.
Summary rept.
Little (Arthur D.), Inc., Cambridge, Mass.
Jun 66, 43p
Prepared in cooperation with Atuomobile Manufacturers Association, Inc.

Descriptors: (*Traffic, *Safety), Passenger vehicles, Accidents, Drugs, Training, Roads, Addiction, Visibility, Mortality rates, Vehicle brakes, Signals, Protection, Impact tests, Law, State-of-the-art reviews.

Contents: Human factors--initiation phase; Environmental factors--initiation and impact phase; Vehicular factors--initiation phase; Vehicular factors --impact phase; Loss-limiting factors--post accident phase; Regulatory and legal factors. (Author)
PB-175 615 HC$3.00 MF$0.65

13M. Structural Engineering

STUDY OF MICROMECHANICAL PROPERTIES OF ADHESIVE BONDED JOINTS.
General Precision Inc Little Falls N J Aerospace Research Center
For primary bibliographic entry see Field 11A.
AD-655 850 HC$3.00 MF$0.65

SHELTER LIGHTING KIT.
General American Transportation Corp Niles Ill General American Research Div
For primary bibliographic entry see Field 13A.
AD-655 904 HC$3.00 MF$0.65

PERFORMANCE OF ASPEN WOOD EXCELSIOR FOR USE IN EVAPORATIVE COOLERS.
General American Transportation Corp Niles Ill General American Research Div
For primary bibliographic entry see Field 13A.
AD-655 905 HC$3.00 MF$0.65

A METHOD FOR WEIGHT OPTIMIZATION OF FLAT TRUSS-CORE SANDWICH PANELS UNDER LATERAL LOADS.
Final rept. 24 May 65-31 Dec 66,
Structural Mechanics Associates Narberth Pa
J. McCoy, Sidney Shore, and Jack R. Vinson. 1 Jun 67, 71p
NAEC-ASL-1111
Contract N156-46654

Descriptors: (*Optimization, *Sandwich construction), Integral transforms, Sandwich panels, Equations, Weight, Design, Composite materials, Loading (Mechanics).

A method is presented for optimizing, on a weight basis, flat truss-core sandwich panels under lateral loads. To solve this type of problem by equating the stress level for all failure modes requires a knowledge of the stress distribution throughout the panel for the given loading. There are no available stress analysis methods of sufficient sophistication for corrugated panels under lateral loading; hence, a large portion of this report is devoted to the development of such a method of analysis. The method is essentially a deformation method; however, a technique of using Fourier type transformations makes the solution more tractable. (Author)
AD-656 054 HC$3.00 MF$0.65

STRUCTURAL OPTIMIZATION OF FLAT, CORRUGATED CORE AND WEB-CORE SANDWICH PANELS UNDER IN-PLANE SHEAR LOADS AND COMBINED UNIAXIAL COMPRESSION AND IN-PLANE SHEAR LOADS.
Final rept. 24 May 65-31 Dec 66,
Structural Mechanics Associates Narberth Pa
Jack R. Vinson, and Sidney Shore. 1 Jun 67, 101p
NAEC-ASL-1110
Contract N156-46654

Descriptors: (*Optimization, *Sandwich panels), Sandwich construction, Compressive properties, Loading (Mechanics), Stability, Weight, Design, Structures, Buckling (Mechanics), Equations.

The report presents the development of rational methods of structural optimization for flat, corrugated core (single truss core) and web-core sandwich panels under two loading conditions: in-plane shear loads, and combined uniaxial compression and in-plane shear loads. These methods provide a means by which minimum weight structures can be designed for a given load index, plate width, length, and face and core materials. The methods developed can be used as a means of rational material selection by comparing weights of optimum construction for various material systems as a function of applied load index. The methods are sufficiently general to account for orthotropic or isotropic face and core materials and various boundary conditions. Design procedures are given in detail for the design engineer to use. (Author)
AD-656 056 HC$3.00 MF$0.65

ENGINEERING AND MATERIAL CONSIDERATIONS IN BURIED PLANT,
Rural Electrification Administration Washington D C
For primary bibliographic entry see Field 9A.
AD-656 072 HC$3.00 MF$0.65

ALUMOWELD: A NEW BIMETALLIC WIRE FOR ELECTRICAL AND STRENGTH APPLICATIONS,
Copperweld Steel Co Glassport Pa
For primary bibliographic entry see Field 11F.
AD-656 287 HC$3.00 MF$0.65

THE LAMBDA METHOD FOR BOUNDARY VALUE PROBLEMS.

University Coll Cork (Ireland) Dept of Mathematical Physics
For primary bibliographic entry see Field 20K.
AD-656 391 HC$3.00 MF$0.65

DEVELOPMENT OF A CONDITION OF MAINTENANCE RATING SCALE AND SAMPLING PROCEDURES FOR BUILDINGS OF THE NAVAL SHORE ESTABLISHMENT.
Research rept. 30 Jun-30 Sep 65,
Battelle Memorial Inst Columbus Ohio
Robert N. Pesut, and Donald D. Renwick. Dec 65, 58p
NCEL-CR-65.007
Contract NBy-62175

Descriptors: (*Naval shore establishments, Buildings), (*Buildings, Maintenance), Sampling, Measurement, Management planning, Inventory analysis, Scale.

Presented are the results of a partial study conducted for the development of a condition of maintenance rating scale and sampling procedures for buildings of the Naval Shore Establishment. Several models for rating individual buildings were investigated, and a discussion of these models is included. Also included are considerations for the development of a sampling procedure to arrive at an activity rating. (Author)
AD-656 584 HC$3.00 MF$0.65

PIONEER POLAR STRUCTURES - MOBILE FOUNDATION FOR JAMESWAYS UP TO 64 FEET LONG.
Technical rept. Jul 64-Feb 67,
Naval Civil Engineering Lab Port Hueneme Calif
G. E. Sherwood. Jul 67, 20p Rept no. NCEL-TR-538

Descriptors: (*Foundations (Structures), *Arctic regions), Joints, Mobile, Costs, Weight, Volume, Design, Snow, Mechanical fasteners, Steel, Prefabricated buildings, Damage, Manpower, Time.

Polar camps require frequent relocation due to burial by drifting snow or site contamination by camp waste. Jamesway buildings up to 64 feet long are widely used in polar camps at outlying work centers and construction projects. In order to eliminate the labor required to completely disassemble and reassemble these buildings for relocating them, a mobile foundation for Jamesways up to 64 feet long was developed. This steel foundation is hinged 32 feet from the end to reduce bending moment when more than a 32-foot length is used, and is cross-braced in each 16-foot length to keep it square. A prototype 64-foot-long foundation was given two tests on snow near McMurdo, Antarctica. It was loaded with weights to simulate the weight of a Jamesway, and towed 3 miles without damage over terrain which had ridges up to 2 feet high. The following season, a Jamesway was erected on the foundation, and the building was towed 1 mile without damage. It was concluded that the mobile foundation provides a suitable means for relocating completely assembled Jamesways in the same general area, and that its use would produce significant savings in reduced building damage, manpower, and reoccupancy time. It was recommended that the mobile foundation be used in all areas where Jamesways up to 64 feet long require frequent relocation. (Author)
AD-656 587 HC$3.00 MF$0.65

DESIGNING SHELTER IN NEW BUILDINGS,
Pennsylvania State Univ University Park Shelter Research and Study Program
Albert Knott. Mar 67, 87p
OCD-TR-43
Contract OCD-PS-64-252

Descriptors: (*Fallout shelters, Design), Buildings, Shielding, Gamma rays, Construction materials, Instruction manuals, Civil defense systems.

The manual discusses radiation shielding as it applies to the preliminary designing of protection against fallout gamma radiation in new construction. The architectural principles of shielding are discussed at length and designing examples are given. Planning charts are presented whereby material weights can be selected on a preliminary basis to provide shielding which will satisfy the Office of Civil Defense requirements for Community Shelters. Environmental control, shelter supply, and management factors are not discussed as they are auxiliary to the problem of the provision of radiation protection. It is anticipated that the preliminary architectural schemes developed through the use of this manual will be verified by skilled analysts before final designs are completed. (Author)
AD-656 595 HC$3.00 MF$0.65

PROTECTIVE BLAST SHELTER SYSTEM ANALYSIS.
Final rept.
Bechtel Corp Gaithersburg Md
Apr 67, 244p
Contract OCD-PS-66-10

Descriptors: (*Shelters, Systems engineering), (*Urban areas, Shelters), Rhode Island, Population, Distribution, Site selection, Hazards, Costs, Construction, Roads, Underground structures, Civil defense systems.

Feasibility of 25 psi blast shelter system for entire population of Providence, R. I. is investigated. Factors analyzed include: peak population distribution; site availability and ownership; accessibility and travel time; characteristics of site and surrounding terrain; potential flooding, fire, and debris hazard; and potential dual purpose shelter applications. Legal financial and construction problems are discussed. Maps and tables define a network of 46 shelters capable of loading to capacity within 30 minutes after alert. Complete coverage of populated areas of the city is afforded by a maximum 3/4 mile walking radius of shelter. Single purpose shelters cost an estimated $204. per person. Dual purpose shelters such as garages, schools and offices could reduce federal outlay to $147. per person. Cost variation of shelter structure and site sensitive factors with capacity are graphically presented. Additional cost studies cover austere shelter with packaged ventilation kits, cost of upgrading existing below ground structures, and life support systems. An addendum discusses problems of constructing shelters under streets. (Author)
AD-656 625 HC$3.00 MF$0.65

ON WILLEMS' EXPERIMENTAL VERIFICATION OF THE CRITICAL LOAD IN BECK'S PROBLEM,
California Univ San Diego La Jolla Dept of the Aerospace and Mechanical Engineering Sciences
For primary bibliographic entry see Field 20K.
AD-656 659 Not available from CFSTI.

SHOCK WAVE TRANSMISSION THROUGH A LARGE RESTRICTION IN A CONSTANT AREA DUCT.
Ballistic Research Labs Aberdeen Proving Ground Md
For primary bibliographic entry see Field 20D.
AD-656 744 HC$3.00 MF$0.65

SELF-RIGIDIZING EXPANDABLE-SANDWICH AEROSPACE SHELTERS AND SOLAR COLLECTORS.
Archer Daniels Midland Co Minneapolis Minn
For primary bibliographic entry see Field 22B.
AD-656 747 HC$3.00 MF$0.65

THE USE OF SCALE MODELS IN STRUCTURE SHIELDING EXPERIMENTS.
Technical Operations Inc Burlington Mass
For primary bibliographic entry see Field 18F.
AD-656 756 HC$3.00 MF$0.65

SOUND INSULATION OF WALL, FLOOR AND DOOR CONSTRUCTIONS,
National Bureau of Standards, Washington, D. C.
For primary bibliographic entry see Field 20A.
NBS-MONO-77 HC$0.40 MF$0.65

BEHAVIOR OF WELDED BUILT-UP BEAMS UNDER REPEATED FLEXURAL LOADS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
J. E. Stallmeyer, and W. H. Munse. Sep 66, 192p
tract CPR-11-7768
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Beams (Structural), *Fatigue (Mechanics)), Loading (Mechanics), Arc welding, Bridges, Physical properties, Stresses, Metal joints, Steel, Tests, Design, Metal plates, Thickness, Deposition, Cracks, Tables.

The experimental studies described in this report were conducted to determine the behavior of welded flexural members of the type used in bridge construction, to find means of increasing the fatigue life of such welded structures, and to develop related information which will advance the art of bridge design. For this purpose, flexural fatigue tests were carried out on small all-welded beams fabricated from a number of steels ranging from A-373-58T with a yield point of 32,000 psi to A-514-65 with a yield point of 100,000 psi. Manual arc welding, with E-7016 electrodes or E-11018 electrodes where appropriate, was used in the fabrication of most of the specimens included in this report. Several specimens were fabricated with the submerged arc welding process for comparison purposes. In one phase of the investigation a rolled section was used as the basic element of the specimen. A sufficient number of tests were conducted on the same detail in specimens made of the different strength steels but subjected to the same stress cycle to provide a good indication of the relative strength of the various steels under identical conditions. A summary of the tests performed and included in this report is presented of which contains information regarding the nature of the specimen, the base material, the type of detail, the depth of the beam, the welding procedure used, the stress cycle employed and the number of tests conducted. (Author)
PB-175 519 HC$3.00 MF$0.65

LATERAL DISTRIBUTION OF DYNAMIC LOADS IN A PRESTRESSED CONCRETE BOX-BEAM BRIDGE DREHERSVILLE BRIDGE,
Lehigh Univ., Bethlehem, Pa. Fritz Engineering Lab.
Albert A. Guilford, and David A. VanHorn. Feb 67, 123p 315.2
See also PB-174 633.

Descriptors: (*Bridges, *Load distribution), (*Loading (Mechanics), Bridges), Concrete, Strain gages, Instrumentation, Deflection, Vehicles, Oscillographs, Structural parts, Beams (Structural), Roads, Stresses, Tests, Surface properties, Toughness, Design.

The report describes the field testing of a two-lane beam-slab highway bridge consisting of a reinforced concrete deck supported by five precast prestressed concrete box girders. The test structure was the first of five similar structures included in an investigation of lateral load distribution in bridges of this particular type. The principal objectives were to develop information on the distribution of vehicle loads to the girders, and to evaluate various field test techniques for use in the follow-

ing studies. The report covers the effects of moving vehicles on lateral distribution of load to the girders. The effects are compared with the results from crawl-runs (2 mph) of the load vehicle, as described in an earlier report. It was found that increases in moment coefficients over crawl-run values were generally less than the value of the impact factor (50/L+125) used in the design of the structure. The differences were greater for the interior girders than for the exterior girders. However, it is felt that runs at speeds greater than 34 mph are necessary before the absolute maximum increases can be determined. Also, it was found that the magnitudes of the distribution coefficients were relatively insensitive to the speed of the load vehicle. The distribution factors resulting from crawl-run tests were greater than those developed from the speed runs. The use of superposition yielded excellent results for crawl-run loading and for one truck at crawl speed with the other at a higher speed. However, with both trucks at high speeds, the correlation of values from two-truck runs with those obtained by superposition was poor. The measured natural frequency of the unloaded bridge was in close agreement with the theoretical value. (Author)

PB-175 637 HC$3.00 MF$0.65

ANALYSIS OF SIMPLY SUPPORTED BOX GIRDER BRIDGES: REPORT OF AN INVESTIGATION,

California Univ., Berkeley. Structures and Materials Research.

A. C. Scordelis. Oct 66, 124p SESM-66-17

Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Bridges, *Structures), Thickness, Design, Computer programs, Stresses, Beams (Structural), Reinforced concrete, Mechanical properties, Tests, Analysis.

The report describes the development of an analytical method of determining stresses and displacements of simply supported box girder bridges subjected to any loading. The method, a direct stiffness solution using folded plate theory and a harmonic representation of the loading, consists of two parts. One part is applicable in bridges without interior transverse diaphragms, while the other is used when diaphragms are present. Although numerous box girder bridges were analyzed during the conduct of the research, only results based on two span lengths (60' and 80') and four cell arrangements (3,4,6 and 8 cells) are presented in the report. Numerous charts and tables are shown which picture load distribution, slab and web moments as well as longitudinal and transverse stresses for bridges with and without diaphragms. The report also contains an extensive bibliography, along with a detailed description of the computer programs used in the analysis. (Author)

PB-175 646 HC$3.00 MF$0.65

EPOXY BONDED AGGREGATES AS A SHEAR CONNECTING MEDIUM IN COMPOSITE BEAM CONSTRUCTION,

California State Div. of Highways. Bridge Dept.

C. F. Stewart. Jan 67, 48p

Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Beams (Structural), *Bonding), Composite materials, Epoxy plastics, Captive tests, Deflection, Corrosion, Steel, Reliability, Loading (Mechanics).

Identifiers: Aggregates.

The report describes and presents the results of static tests on four simply supported 39 foot composite beams. Three of the beams had half inch diameter aggregate bonded by an epoxy to the top flange to act as a shear connecting medium between the steel and the 7 inch concrete slab. Two of these beams also had a small number of conventional welded studs to prevent vertical separation of slab and beam. The fourth beam had only the welded studs. The beams were loaded in increments to failure. Relative slip, strains, and deflections were measured. Some corrosion of the top flange was attributed to the epoxy-aggregate system. It was concluded that epoxy bonded aggregate is effective as a shear connecting device under static loading. Long time reliability, behavior under repetitive loads and the apparent corrosion problem will have to be investigated in the future. (Author)

PB-175 647 HC$3.00 MF$0.65

14. METHODS AND EQUIPMENT

14A. Cost Effectiveness

REPAIR VERSUS REPLACEMENT, A STUDY OF EQUIPMENT MAINTENANCE.

Pacific Missile Range Point Mugu Calif

For primary bibliographic entry see Field 15E.

AD-656 435 HC$3.00 MF$0.65

14B. Laboratories, Test Facilities, and Test Equipment

PROCESS CONTROL METHODS FOR DETERMINING SMALL AMOUNTS OF MOISTURE IN PYROTECHNICS. I. ELECTROLYTIC HYGROMETER.

Picatinny Arsenal, Dover, N. J. Ammunition Engineering Directorate.

For primary bibliographic entry see Field 19A.

AD-463 061 HC$3.00 MF$0.65

A COSMIC RAY PROGRAM FOR THE STUDY OF STRONG INTERACTION PHYSICS IN THE RANGE OF 100-1000 GeV,

Technical rept.,

Michigan Univ Ann Arbor Dept of Physics

Lawrence W. Jones. Jun 67, 29p Rept no. TR-30, 03106-30-T

Contract Nonr-1224 (23)

Descriptors: (*Physics laboratories, *Design), (*Cosmic rays, Symposia), Momentum, Protons, Liquefied gases, Hydrogen, Ionization chambers, Costs, Synchrotrons, Nuclear energy, Tables, Feasibility studies, Proportional counters.

There has been continuing discussions on the possibility of erecting an ambitious cosmic ray experimental facility at mountain altitudes directed toward the study of strong-interaction physics in the energy range of 100 to 1000 GeV. Several specific objectives for such a facility are: that nucleon interactions be studied on free protons, a liquid hydrogen target; that the identity of the incident particle be ascertained and that momentum analysis of the incident and reaction products be precise to a few percent; and that the total number of events collected at energies well above existing accelerator energies be over 10,000 per year. The report is a study of the technical and scientific questions encountered in the design of such a facility. (Author)

AD-655 908 HC$3.00 MF$0.65

USE OF NEON EXCHANGE GAS FOR PRECOOLING 3He CRYOSTATS.

Revised ed.,

Dartmouth Coll Hanover N H

John N. Kidder. 2 Dec 66, 4p

AFOSR-67-1709

Contract AF 49 (638)-1717

Revision of manuscript submitted 31 Oct 66.

Availability: Published in The Review of Scientific Instruments v38 n4 p555-6 Apr 1967.

Descriptors: (*Cryostats, Cooling), (*Coolants, *Neon), Solidified gases, Liquefied gases, Helium, Instrumentation, Efficiency.

Experimental developments are described for instrumental set ups to operate from 77K to below 1K. The efficiency of various systems based on helium-3, helium-4, air and neon are described along with visual indicators that permit the use of solid/liquid neon as the best exchange medium between the low and medium temperature portions of a cryogenic system. (Author)

AD-655 991 Not available from CFSTI.

ELECTRON MICROSCOPY OF POLYETHYLENE BELOW 20K,

Sussex Univ Brighton (England) School of Mathematical and Physical Sciences

J. A. Venables, and D. C. Bassett. 24 Apr 67, 4p

AFOSR-67-1780

Grant AF-EOAR-61-65

Prepared in cooperation with Reading Univ. (England), Thompson Physical Lab.

Availability: Published in Nature v214 n5093 p1107-8 Jun 10 1967.

Descriptors: (*Polyethylene plastics, *Electron microscopy), Crystal structure, Degradation, Electron bombardment, Cryogenics, Radiation damage, Great Britain.

The note describes experiments to determine if the lifetime of crystalline polyethelene in the electron microscope is increased when the polyethelene is cooled below 20K. It was found that the lifetimes were the same at all temperatures between room temperature and 20K to within a factor of two. An explanation for this result is offered. Thus the problems of making electron microscope observations on polymer crystals (in at least this case) are not solved by observation at very low temperatures. (Author)

AD-656 005 Not available from CFSTI.

RADIOLOGICAL SAFETY INSTRUCTIONS FOR THE LANE-WELLS NUCLEAR SEDIMENT DENSITY METER.

Naval Oceanographic Office Washington D C

For primary bibliographic entry see Field 18D.

AD-656 083 HC$3.00 MF$0.65

A NEW DEVELOPMENT FOR MONITORING PRESSURIZED CABLE PLANT. PART I. SYSTEM AND ECONOMIC ASPECTS,

Radio Corp of America New York Communications Systems Div

For primary bibliographic entry see Field 9A.

AD-656 114 HC$3.00 MF$0.65

ELECTRICAL FATIGUE AND DIELECTRIC STRENGTH IN TEFLON TFE INSULATION,

Brand-Rex Div Willimantic Conn

For primary bibliographic entry see Field 11I.

AD-656 171 HC$3.00 MF$0.65

AN ADAPTER TO IMPROVE THE SENSITIVITY OF THE Q METER FOR DIELECTRIC LOSS MEASUREMENTS OF POLYETHYLENE,

Union Carbide Corp New York Plastics Div

Louis A. Rosenthal, and Thomas Hazen. 1960, 31p

Prepared for presentation at the Signal Corps Wire and Cable Symposium, Asbury Park, N. J., Nov 30-Dec 3 1960.

Descriptors: (*Electric insulation, Test equipment), (*Polyethylene plastics, Dielectric properties), (*Q meters, Adapters), Electrical conductance, Measurement, Resolution, Sensitivity, Voltmeters, Circuits.

A device, which can be adapted to a Q meter to increase its resolution by a factor of about five, was developed. In addition to being a differential voltmeter, the adapter can inject a variable con-

ductance into the Q meter circuit. The theory and design of the G adapter is presented, and experimental measurements that were performed using the developed instrument are described.
AD-656 201 HC$3.00 MF$0.65

SUBMARINE CABLE SYSTEM FOR THE FLORIDA MISSILE TEST RANGE,
Air Force Missile Test Center Patrick AFB Fla
For primary bibliographic entry see Field 9A.
AD-656 256 HC$3.00 MF$0.65

MICRODENSITOMETRIC DETERMINATION OF DISPERSION,
Union Carbide Corp New York Plastics Div
W. G. Best, and H. F. Tomfohrde. 1958, 6p
Annual Wire and Cable Symposium (7th), Asbury Park, N. J., December 2-4 1958.
Availability: Published in Unidentified journal.

Descriptors: (*Electric insulation, Test equipment), (*Polyethylene plastics, Test methods), (*Carbon black, Test methods), (*Densitometers, Operation), Additives, Microanalysis, Accuracy.

The paper briefly describes a method and apparatus for the measurement of carbon black dispersion in polyethylene. The work illustrates a potential method which is free of empirical influences, more reliable and precise, and less time consuming. The testing thus far indicates that with more precise instrumentation it should be possible to measure carbon black dispersion and gels independently and to determine, electronically, a dispersion index.
AD-656 275 Not available from CFSTI.

MEASUREMENT OF THE DEGREE OF DISPERSION OF CARBON BLACK IN POLYETHYLENE USING ABSORPTION OF LIGHT,
Battelle Memorial Inst Columbus Ohio
For primary bibliographic entry see Field 11I.
AD-656 280 HC$3.00 MF$0.65

A STUDY OF SIMULATOR CAPABILITIES IN AN OPERATIONAL TRAINING PROGRAM.
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 5I.
AD-656 308 HC$3.00 MF$0.65

ROCKET INSTRUMENTATION FOR SOLAR ECLIPSE MEASUREMENTS - 12 NOVEMBER 1966,
Utah Univ Salt Lake City Upper Air Research Labs
For primary bibliographic entry see Field 3C.
AD-656 342 HC$3.00 MF$0.65

INSTRUMENTATION AND TECHNIQUES FOR MOSPHERE MEASUREMENTS.
Control Equipment Corp Needham Heights Mass
For primary bibliographic entry see Field 4A.
AD-656 393 HC$3.00 MF$0.65

THE TESTING OF POLYVINYLCHLORIDE ELECTRICAL FORMULATIONS,
Monsanto Chemical Co St Louis Mo
For primary bibliographic entry see Field 11I.
AD-656 404 HC$3.00 MF$0.65

DEVELOPMENT AND ENGINEER DESIGN TEST OF THE 10-KW, 60-CYCLE MILITARY STANDARD ENGINE GENERATOR SET MODEL SF 10.0 MD, VOLUME IV,
Army Engineer Research and Development Labs Fort Belvoir Va
For primary bibliographic entry see Field 10B.
AD-656 441 HC$3.00 MF$0.65

DEVELOPMENT AND ENGINEER DESIGN TEST OF THE 10-KW, 60-CYCLE MILITARY STANDARD ENGINE GENERATOR SET MODEL SF 10.0 MD,
Army Engineer Research and Development Labs Fort Belvoir Va
For primary bibliographic entry see Field 10B.
AD-656 442 HC$3.00 MF$0.65

DEVELOPMENT AND TEST OF THE 1.5-KW, 60-CYCLE, MILITARY-DESIGN, ENGINE-DRIVEN GENERATOR SET, MODEL SF-1.5-MD.
Army Engineer Research and Development Labs Fort Belvoir Va
For primary bibliographic entry see Field 10B.
AD-656 444 HC$3.00 MF$0.65

NCEL OCEAN ENGINEERING PROGRAM, MARCH 1966-MARCH 1967.
Naval Civil Engineering Lab Port Hueneme Calif
For primary bibliographic entry see Field 13J.
AD-656 453 HC$3.00 MF$0.65

SYSTEM DESIGN FOR THE ATMOSPHERIC SCIENCES OFFICE WIND RESEARCH FACILITY,
Atmospheric Sciences Lab White Sands Missile Range N Mex
For primary bibliographic entry see Field 4B.
AD-656 464 HC$3.00 MF$0.65

TRANSDUCER CALIBRATION FACILITY AT SAN VICENTE LAKE,
Scripps Institution of Oceanography San Diego Calif Marine Physical Lab
Daniel K. Gibson, and Richard P. Lewis. 20 Jan 67, 57p Rept no. SIO-Ref-67-4
Contract Nonr-2216 (05)

Descriptors: (*Physics laboratories, *Underwater sound), Calibration, Electronic equipment, Underwater telephones, Transducers, Measurement, Test methods, Low frequency, California.

A 24' X 50' general purpose research platform has been located at San Vicente Lake. The facility is moored in 100 ft-minimum depth of water with approximately 4500 ft of unobstructed range. The barge is supplied with 440-3 phase ac power as well as 110-220 unregulated and 110 regulated 1 phase ac power. Boat and loading facilities are available. Equipment handling gear and tool set are included on the barge. Test capabilities at the facility include: source and receiver response, directivity pattern plots, null-balance measurements, Z and theta measurements. A set of calibrated PZT4 cylindrical crystals are available to accomplish the above tests. System frequency response is from 1kHz to 100 kHz. A set of checkout procedures and rules governing facility use are included n this report. A complete facility electronic equipment description and a set of suggested operational test procedures are also included. (Author)
AD-656 467 HC$3.00 MF$0.65

PULSED MAGNETIC FIELD FERROMAGNETIC MICROWAVE GENERATOR.
Quarterly rept. no. 1, 1 Jan-31 Mar 67,
Microwave Electronics Palo Alto Calif
L. D. Buchmiller, and F. A. Olson. Aug 67, 29p
ECOM-0215-1
Contract DAAB07-67-C-0215

Descriptors: (*Pulse generators, *Ferromagnetic materials), Magnetic fields, Ferrites, Performance (Engineering), Electrodes, X band, Microwave equipment, Circuits, Voltage, Electric switches, Frequency.

Operating experience has been obtained with the Stanford Model 11-B pulsed ferrite X-band generator. Preliminary pulser tests were performed with a commercially available voltage-triggered spark gap switch. A pulse rise time of one nanosecond at 10 kV was obtained at a pulse repetition frequency of 1000 Hz. (Author)
AD-656 473 HC$3.00 MF$0.65

THE SUBSONIC WIND TUNNEL OF BATTELLE MBUS LABORATORIES.
Research rept.,
Battelle Memorial Inst Columbus Ohio Columbus Labs
Vernon O. Hoehne. 15 Jun 67, 54p

Descriptors: (*Wind tunnels, *Subsonic characteristics), Design, Turbulence, Aerodynamics, Laboratories, Circuits, Velocity, Costs, Management engineering, Ohio.

The Subsonic Wind Tunnel of Battelle Columbus Laboratories has been developed to provide a quality research tool that is economical to operate. It can provide air velocities to 250 fps with a turbulence level of 0.10 percent or less through a 55-inch-high by 38.5-inch-wide test section. Models are mounted directly to the walls, floor, or ceiling of the test section, or on a sting. The report is a description of the tunnel, its management procedures, and cost to users. (Author)
AD-656 486 HC$3.00 MF$0.65

LASER FOG DISDROMETER SYSTEM.
Technical Operations Inc Burlington Mass
For primary bibliographic entry see Field 20E.
AD-656 487 Not available from CFSTI.

INVESTIGATION OF ABLATION EFFECTS ON HYPERSONIC DYNAMIC STABILITY OF A 10 DEG. CONE.
LTV Aerospace Corp Dallas Tex LTV Vought Aeronautics Div
For primary bibliographic entry see Field 20D.
AD-656 492 HC$3.00 MF$0.65

TEST OF AVIATION ENGINES,
Foreign Technology Div Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 21E.
AD-656 565 HC$3.00 MF$0.65

DEVELOPMENT AND ENGINEER DESIGN TEST OF THE 10-KW, 60-CYCLE MILITARY STANDARD ENGINE GENERATOR SET MODEL SF 10.0 MD.
Army Engineer Research and Development Labs Fort Belvoir Va
For primary bibliographic entry see Field 10B.
AD-656 614 HC$3.00 MF$0.65

DEVELOPMENT AND ENGINEER DESIGN TEST OF THE 10-KW, 60-CYCLE MILITARY STANDARD ENGINE GENERATOR SET MODEL SF 10.0 MD, VOLUME I,
Army Engineer Research and Development Labs Fort Belvoir Va
For primary bibliographic entry see Field 10B.
AD-656 615 HC$3.00 MF$0.65

DEVELOPMENT AND ENGINEER DESIGN TEST OF THE 10-KW, 60-CYCLE MILITARY STANDARD ENGINE GENERATOR SET MODEL SF 10.0 MD, VOLUME III,
Army Engineer Research and Development Labs Fort Belvoir Va
For primary bibliographic entry see Field 10B.
AD-656 616 HC$3.00 MF$0.65

IONIZING SHOCK STUDIES IN AN ELECTROMAGNETICALLY DRIVEN SHOCK TUBE,

Columbia Univ New York
For primary bibliographic entry see Field 20I.
AD-656 716 Not available from CFSTI.

FM TAPE RECORDER FREQUENCY ALIGNMENT UNIT,
Naval Ordnance Lab White Oak Md
A. D. Delagrange, and R. H. Davis. 1 May 67, 17p Rept no. NOLTR-67-50

Descriptors: (*Recording systems, *Test equipment (Electronics)), (*Sound reproduction systems, Test equipment (Electronics)), (*Radiofrequency oscillators, Alignment), Frequency modulation, Comparators, Portable, Miniature electronic equipment, Calibration.
Identifiers: Tape recorders.

A small, battery-operated test instrument has been built for quick adjustment of the carrier frequency oscillators of FM tape recorders. The instrument uses integrated circuits, miniature components and printed circuitry. It is small, light, inexpensive and dependable. The method of measurement could be applied to other problems where an unknown frequency must be compared with a reference. (Author)
AD-656 722 HC$3.00 MF$0.65

CORRELATIONS BETWEEN FLEXURAL AND DIRECT STRESS LOW-CYCLE FATIGUE TESTS.
Naval Ship Research and Development Center Annapolis Md Annapolis Div
For primary bibliographic entry see Field 11F.
AD-656 746 HC$3.00 MF$0.65

A FAMILY OF NEW ISOTOPIC WATER CURRENT METERS (THE DWICAS).
Johnston (William H.) Labs., Inc., Baltimore, Md.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 15.
JLI-2748-86 HC$3.00 MF$0.65

BIBLIOGRAPHY AND INDEX ON VACUUM AND LOW PRESSURE MEASUREMENT, JANUARY 1960 TO DECEMBER 1965,
National Bureau of Standards, Washington, D. C. Inst. for Basic Standards.
W. G. Brombacher. 31 May 67, 118p
Availability: Also available from the Superintendent of Documents, GPO, Washington, D. C., 20402, Hard copy $0.50.

Descriptors: (*Vacuum, Bibliographies), (*Low-pressure research, Bibliographies), Measurement, Diffusion, Vacuum seals, Adsorption, Vacuum pumps, Solids, Gases, Vacuum apparatus, Subject indexing, Degasification, Instrumentation, Manometers, Vacuum-operated valves.

The bibliography, a supplement to NBS Monograph 35, of the same title, covers the years 1960 to 1965, inclusive, and includes 109 references for prior years not listed in Monograph 35. It contains 1787 references, 38 of which are to books. The references, besides those directly concerned with pressure measurement, include those on vacuum technology which may bear on the technique of vacuum measurement, such as on adsorption and desorption, diffusion of gases into solids, gas conductance and hardware such as pumps, seals and traps. Author and subject indices are provided. (Author)
NBS-Mono-35-Suppl-1 HC$0.65 MF$0.65

PROCEEDINGS OF THE 1966 STANDARDS LABORATORY CONFERENCE HELD MAY 9-12, 1966, NATIONAL BUREAU OF STANDARDS, GAITHERSBURG FACILITY, WASHINGTON, D. C.
National Bureau of Standards, Washington, D. C. 13 Jul 67, 173p
Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402 $1.00.

Descriptors: (*Standards, Symposia), Laboratories, Calibration, Scientific organizations, Statistical analysis, Documentation, Scientific personnel, Test equipment, Research program administration, Time studies, Management control systems.
Identifiers: Standards Laboratories.

The document is comprised of the addresses and technical papers read at the conference. The following general topics were covered: Measurement comparisons, statistical procedures, information for standards laboratories, calibration procedures, the measurement system of the United States, national calibration requirements, personnel development, traceability and accuracy ratios, worldwide unification of industrial standards, test equipment performance requirements, standards laboratory organization and management, workload control, development of recommended practices for NCSL.
NBS-MP-291 HC$1.00 MF$0.65

THEORETICAL AND EXPERIMENTAL STUDIES OF THE UNDERLYING PROCESSES AND TECHNIQUES OF LOW PRESSURE MEASUREMENT PROGRESS REPORT, 1 JUN. 1966 - 31 MAY 1967.
Illinois Univ., Urbana.
D. E. Coad, J. W. Culton, R. N. Peacock, F. M. Propst, and W. C. Schuemann. 31 May 67, 18p NASA-CR-85970
Grant NSG-376

Descriptors: *Ionization cross section, *Pressure apparatus, *Vacuum gauge, Apparatus, Application, Calibration, Comparison, Cross section, Gauge, Ionization, Low pressure, Measurement, Pressure, Refinement, Testing, Vacuum.

For abstract, see STAR 05 18.
N67-31709 HC$3.00 MF$0.65

DESIGN AND DEVELOP FAST SCAN INFRARED DETECTION AND MEASURING INSTRUMENT. PHASE IV - EXPERIMENTAL STUDY.
Raytheon Co., Wayland, Mass. Advanced Development Lab.
A. S. Dostoomian, and R. Vanzetti. 15 May 67, 55p NASA-CR-85602
Contract NAS8-11604

Descriptors: *Failure, *Infrared detector, *Scanning device, *Transistor, Circuit, Detector, Device, Fast, Gate, Infrared, Input, Integration, Measurement, Microscope, Optics, Performance, Power, Scanning, Tradeoff.

For abstract, see STAR 05 18.
N67-31723 HC$3.00 MF$0.65

UNDERWATER OPERATION EXPERIMENTS EVALUATION.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
J. R. Rasquin. 29 May 67, 17p NASA-TM-X-53614

Descriptors: *Control valve, *Underwater test, Control, Electric, Evaluation, Gravity, Hatch, High altitude, Impact, Pressure, Regulator, Saturn s- ivb stage, Suit, Test, Underwater, Valve, Wrench, Zero.

For abstract, see STAR 05 18.
N67-31849 HC$3.00 MF$0.65

PRELIMINARY DESIGN STUDY OF A LUNAR GRAVITY SIMULATOR INTERIM REPORT.
Lockheed Missiles and Space Co., Huntsville, Ala. Huntsville Research and Engineering Center.
25 Oct 66, 48p NASA-CR-84861, LMSC/HREC-A783335, REV. A
Contract NAS8-20351
Revision A

Descriptors: *Gravity, *Lunar surface vehicle, *Sensing, *Simulator, Configuration, Earth, Lunar, Surface, Suspension, Vehicle.

For abstract, see STAR 05 18.
N67-31857 HC$3.00 MF$0.65

EFFECTS OF JET PLUMING ON THE STATIC STABILITY OF FIVE ROCKET MODELS AT MACH NUMBERS OF 4, 5 AND 6 AND STATIC PRESSURE RATIOS UP TO 26,000.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 18.
N67-31989 HC$3.00 MF$0.65

A NARROW FIELD-OF-VIEW, HIGH RADIANT HEAT FLUX SENSOR FINAL REPORT.
Rocketdyne, Canoga Park, Calif.
P. E. Schumacher. 10 Jan 67, 45p NASA-CR-86625, R-6741
Contract NAS8-11994

Descriptors: *Heat flux, *Radiometer, *Rocket exhaust, Calibration, Characteristic, Constant, Design, Emission, Energy, Exhaust, Fabrication, Field, Flux, Heat, Linearization, Narrow, Performance, Plume, Protection, Radiance, Rocket, Short, Thermal, Time.

For abstract, see STAR 05 18.
N67-32100 HC$3.00 MF$0.65

SOVIET ANTARCTIC EXPEDITIONS, 1959 - 1961.
Israel Program for Scientific Translations, Ltd., Jerusalem.
A. V. Nudelman. 1966, 161p TT-65-50145
Transl. Into English of the Book "sovetskie Ekspeditsii V Antarktiku 1959- 1961 Gg." Moscow, Izd. An Sssr, 1962 Published for Nsf

Descriptors: *Antarctica, *Geography, *Meteorological station, *Research facility, Activity, Expedition, Facility, Fifth, Meteorology, Movement, Position, Research, Six, Station, U.S.S.R., Vessel.

For abstract, see STAR 05 18.
N67-32168 HC$3.00 MF$0.65

SOVIET ANTARCTIC EXPEDITIONS, 1955 - 1959.
Israel Program for Scientific Translations, Ltd., Jerusalem.
A. V. Nudel Man. 1966, 145p TT-65-50146
Transl. Into English of the Book "sovetskie Ekspeditsii V Antarktiku 1955- 1959 Gg." Moscow, Izd. An Sssr, 1959 Published for Dept. of Interior and Nsf

Descriptors: *Antarctica, *Geography, *Meteorological station, *Research facility, Activity, Expedition, Facility, First, Meteorology, Photography, Research, Second, Station, Third, U.S.S.R..

For abstract, see STAR 05 18.
N67-32170 HC$3.00 MF$0.65

SPACECRAFT TECHNOLOGY. VOLUME V - SPACE ENVIRONMENT.
European Space Research Organization, Paris (France).
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 18.
N67-32181 HC$3.00 MF$0.65

Group 14A—Cost effectiveness

FEASIBILITY STUDY OF A MINIATURE SOLID-STATE PRESSURE TRANSDUCER FINAL REPORT.
Research Triangle Inst., Durham, N. C. Solid State Lab.
C. D. Parker. Jul 67, 84p NASA-CR-66428
Contract NAS1-6249

Descriptors: *P-n junction, *Pressure transducer, *Solid state, Balloon, Diaphragm, Feasibility, Meteorology, Needle, Pressure, Rocket, Silicon, Solid, State, Stress, Transducer.

For abstract, see STAR 05 18.
N67-32330 HC$3.00 MF$0.65

MODIFICATIONS TO INTERIM VISUAL SPACEFLIGHT SIMULATOR QUARTERLY REPORT, 12 JAN. - 12 APR. 1967.
General Electric Co., Syracuse, N. Y. Electronics Lab.
20 Apr 67, 14p NASA-CR-65659, QR-9
Contract NAS9-3916

Descriptors: *Flight simulator, *Manned spacecraft, *Spacecraft instrumentation, *Visual flight, Assembly, Card, Cost, Design, Fabrication, Flight, Hardness, Instrumentation, Lunar, Manned, Modification, Module, Problem, Schedule, Simulator, Spacecraft, Visual, Wire.

For abstract, see STAR 05 18.
N67-32368 HC$3.00 MF$0.65

LEAK DETECTION TECHNIQUE IMPROVEMENT STUDY FOR SPACE VEHICLES FINAL REPORT.
Ohio Univ., Athens. Coll. of Engineering and Technology.
Jan 67, 263p NASA-CR-86677, AR-2-A
Contract NAS8-11199

Descriptors: *Detector, *Halogen, *Leakage, *Space vehicle, Anode, Diode, Dual, Flow, Helium, Hot, Improvement, Membrane, Platinum, Principle, Probe, Separation, Technique, Teflon.

For abstract, see STAR 05 18.
N67-32488 HC$3.00 MF$0.65

PERFORMANCE OF 10-KILOWATT CARBON ARC SOLAR RADIATION SIMULATOR.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
G. C. Goldman, and K. Yass. Aug 67, 9p NASA-TM-X-1411
Contract 124-09-05-03-22

Descriptors: *Carbon arc, *Performance characteristics, *Solar radiation, *Solar simulator, Arc, Carbon, Characteristics, Distribution, Efficiency, Electrode, Energy, Evaluation, Lens, Performance, Radiation, Simulator, Solar, Spectrum, Stability, Tungsten.

For abstract, see STAR 05 18.
N67-32555 HC$3.00 MF$0.65

SLOW SPEED TACHOMETER FOR MEASURING WELD WIRE AND CARRIAGE FEEDS.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
C. Loyd, J. R. Rasquin, and H. E. Smith. 9 Jun 67, 12p NASA-TM-X-53615

Descriptors: *Feed system, *Tachometer, *Welding, Accuracy, Analog, Carriage, Deviation, Display, Feed, Measurement, Output, Rate, Slow, Speed, System, Visual, Wire.

For abstract, see STAR 05 18.
N67-32559 HC$3.00 MF$0.65

RADAR TEST SET AN/UPM-70 AN/UPM-70A.
Bureau of Naval Personnel Representative, Pomona, Calif. Metrology Engineering Center.
For primary bibliographic entry see Field 9C.
PB-175 661 HC$3.00 MF$0.65

APPALACHIAN HARDWOODS FOR PALLETS, A LABORATORY EVALUATION.
Forest Products Lab., Madison, Wis.
For primary bibliographic entry see Field 11L.
PB-175 683 HC$3.00 MF$0.65

WEIGHING HEAVY LOADS TO AN ACCURACY OF 0.001 PERCENT,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
Clarence A. Pippin. 2 May 67, 11p
Contract AT (29-1)-1106

Descriptors: (*Loading (Mechanics), Handling), Load distribution, Weight, Accuracy, Excitation.

For abstract, see NSA 21 15.
RFP-839 HC$3.00 MF$0.65

14D. Reliability

BAYESIAN ANALYSIS OF SYSTEM READINESS.
Research rept.,
Carnegie Inst of Tech Pittsburgh Pa Management Sciences Research Group
D. P. Gaver, Jr. Jul 67, 22p Rept no. RR-105
Contract Nonr-760 (24)

Descriptors: (*Systems engineering, Reliability), Probability, Reliability, Decision theory, Mathematical models.

The paper describes three problems relevant to the estimation of system readiness. A Bayesian approach is taken. (Author)
AD-656 031 HC$3.00 MF$0.65

THERMAL AGING CHARACTERISTICS OF AIRCRAFT WIRES AND CABLES,
Naval Research Lab Washington D C
For primary bibliographic entry see Field 9A.
AD-656 230 HC$3.00 MF$0.65

COMMUNICATION NETWORKS WITH SPECIFIED SURVIVABILITY,
Illinois Univ Urbana Coordinated Science Lab
For primary bibliographic entry see Field 17B.
AD-656 451 HC$3.00 MF$0.65

14E. Reprography

DIRECT COLOR RADIOGRAPHY,
Army Medical Research Lab., Fort Knox, Ky.
For primary bibliographic entry see Field 6L.
AD-203 577 HC$3.00 MF$0.65

AN IMAGE RESTORATION EXPERIMENT ON TURBULENCE-DEGRADED IMAGES,
Scripps Institution of Oceanography San Diego Calif Visibility Lab
Benjamin L. McGlamery. Jul 66, 20p Rept no. SIO-Ref-66-10
Contract NObs-92058

Descriptors: (*Images, Degradation), (*Information theory, Mathematical analysis), (*Data processing systems, Images), Photographic images, Turbulence, Optical images, Digital systems, Visual acuity, Punched cards, Pattern recognition, Photographic contrast.

The report describes an experiment in which processing techniques were applied to turbulence-degraded images to improve their visual image quality. The initial objects were photographed through laboratory-generated turbulence. The resulting transparencies of the degraded images were digitized by a photoelectric scanner, recorded on punched cards, and processed on a digital computer. The processing consisted of applying corrections to the amplitude and phase coefficients of the two-dimensional Fourier series representing the degraded images. The correction factors were obtained from the point spread function of the turbulence measured at the time the images were photographed. The processed data was used to generate photographs of the restored images. The experiment was done for 5-millisecond and 1-minute exposure times. The restored images were found to have significantly more visual detail than the original degraded images, with the 5-millisecond exposure restorations being superior to the 1-minute exposure restorations. (Author)
AD-656 124 HC$3.00 MF$0.65

A SIXTEEN-UNIT PROJECTOR WITH MICROSECOND TURN-ON TIME,
Michigan Univ Ann Arbor Dept of Psychology
Kenneth C. Mylrea. 1966, 7p
AFOSR-67-1808
Contract AF 49 (638)-1235
Prepared in cooperation with Bryn Mawr Coll., Pa.
Availability: Published in The American Journal of Psychology v79 p314-7 Jun 1966.

Descriptors: (*Still projectors, Design), Psychometrics, Visual signals, Performance (Human), Test equipment.

The paper describes a 35mm projector which can select and project up to 16 slides, individually or in combination, in less than 1 microsec. (Author)
AD-656 654 Not available from CFSTI

LUNAR ORBITER I - PHOTOGRAPHY.
Boeing Co., Seattle, Wash.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 18.
N67-32334 HC$3.00 MF$0.65

15. MILITARY SCIENCES

15E. Logistics

ECONOMIC DECISION CRITERIA FOR REPAIR VERSUS THROWAWAY MAINTENANCE.
Final rept. 4 Jun 63-3 Aug 64,
Vitro Labs., Silver Spring, Md.
O. E. Davis. 29 Sep 64, 86p TR-0181601-3
Contract NObsr-89362

Descriptors: (*Naval equipment, *Maintenance), (*Modules (Electronics), Maintenance), Electronic equipment, Costs, Logistics, Mathematical models, Equations.

The purpose of this study was to aid the designer in minimizing the total cost of an equipment during its useful lifetime where total cost is taken to include initial procurement, maintenance, and logistics and to provide criteria for designating the maintenance decision of shipboard repair, depot repair, or throwaway for a module which has already been designed. Mathematical models and graphs were used as a design criteria for affecting the repair or throwaway decision.
AD-455 102 HC$3.00

OPTIMAL MAINTENANCE POLICY AND SALE DATE OF A MACHINE.
Carnegie Inst of Tech Pittsburgh Pa Management Sciences Research Group
For primary bibliographic entry see Field 5A.
AD-656 029 HC$3.00 MF$0.65

STANDARDIZATION OF WIRE TERMINATIONS USED ON MILITARY EQUIPMENT,
American Machine and Foundry Co Alexandria Va Alexandria Div
For primary bibliographic entry see Field 9A.
AD-656 175 HC$3.00 MF$0.65

A PRESENT AND FUTURE VIEW OF THE FIELD ARMY WIRE AND CABLE REQUIREMENTS,
Army Signal Center and School Fort Monmouth N J
For primary bibliographic entry see Field 17B.
AD-656 206 HC$3.00 MF$0.65

OBTAINING MOBILIZATION PREPAREDNESS FOR SIGNAL CORPS WIRE AND CABLE.
Signal Corps Engineering Labs Fort Monmouth N J
1967, 7p

Descriptors: (*Field wire, *Mobilization), (*Electric cables, Mobilization), Operational readiness, Manufacturing methods, Industrial equipment, Stock level control, Materials, Substitutes.

An account is given of the status of mobilization readiness for military field wire and cable which emphasizes the following points: (1) the Signal Corps is in the process of expanding manufacturing know-how and acquiring and storing away (preferably at plant site where it would be used in an emergency) long lead time items of wire manufacturing equipment; (2) the Signal Corps is looking for less critical replacements for the critical materials such as tin and nylon now being used.
AD-656 380 HC$3.00 MF$0.65

BULK HANDLING OF POLYETHYLENE IN CABLE MANUFACTURING,
Western Electric Co Inc Baltimore Md
For primary bibliographic entry see Field 11I.
AD-656 420 HC$3.00 MF$0.65

REPAIR VERSUS REPLACEMENT, A STUDY OF EQUIPMENT MAINTENANCE.
Technical memo.,
Pacific Missile Range Point Mugu Calif
H. Gumbel, and R. J. Frisbie. 15 Aug 61, 36p Rept no. PMR-TM-61-12

Descriptors: (*Maintenance, *Maintenance personnel), (*Logistics, *Maintenance equipment), Costs, Maintainability, Errors, Management engineering, Graphics, Theorems, Operations research, Cost effectiveness.

The present report covers the mathematical foundation for implementing a 'repair versus replacement' policy which minimizes the expected total over-all cost at the end of a given, stipulated time, T. The model of repair costs could be kept fairly general so that the procedure should be applicable for a very broad class of actual situations. Specifically, it was assumed that the expected cumulative cost is a convex function of time, differentiable almost everywhere in the domain of interest. A more detailed analysis was made for the specific case where the expected total cost is parabolic. The influence of the parameter T and the effect of errors in estimating this parameter were investigated. (Author)
AD-656 435 HC$3.00 MF$0.65

TRANSIENT FLOWS IN NETWORKS.
Revised ed.,
Rand Corp Santa Monica Calif
David Gale. 11 Apr 58, 14p Rept no. P-1264

Descriptors: (*Transportation, Networks), (*Logistics, Transportation), (*Scheduling, Optimization), Railroads, Dynamics, Graphics, Theorems, Mathematical analysis.

The paper is concerned with flows in two-terminal dynamic networks as defined by Ford and Fulkerson. These authors have shown how to construct for each positive integer k a flow phi sub k that maximizes the amount u sub k shipped from source to sink in k time periods. Their method leads to different functions phi sub k for different values of k. It is here shown that the problem can be solved by means of a single flow phi that at each time k maximizes the cumulative amount shipped from source to sink; the conclusion holds even when the capacities and transit times in the network are allowed to vary with time. The results of this paper are applicable, for instance, to the analysis of logistics problems involving railway networks. (Author)
AD-656 681 HC$3.00 MF$0.65

ELECTRICALLY HEATED HANDWEAR.
Army Natick Labs Mass Clothing and Organic Materials Div
For primary bibliographic entry see Field 6Q.
AD-656 742 HC$3.00 MF$0.65

THE LOGISTICS PRIMER.
Special text.
Army Logistics Management Center Fort Lee Va
Mar 67, 23p Rept no. USALMC-ST-38-1-1

Descriptors: (*Logistics, Army), Effectiveness, Costs, Inventory, Combat readiness, Inventory control, Military organizations, Army procurement, Maintenance, Supply depots, Army personnel, Management engineering, Army training, Management control systems.

The organization, management, history, and effectiveness of the Army's Logistics system are discussed.
AD-656 750 HC$3.00 MF$0.65

OPTIMUM ALLOCATION OF TRANSPORTATION TERMINALS IN URBAN AREAS.
Research rept.,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
Barton Emmet Cramer. 1 Nov 66, 63p R66-60
Contract C-85-65

Descriptors: (*Transportation, *Urban areas), Population, Theory, Numerical analysis, Computer programs, Velocity, Costs, Feasibility studies.

The report indicates a method of determining the location of a number of transportation terminals in an urban area in such a way that they were most accessible, and thus had the greatest utility from a system customer's point of view. By equating demand distribution with population distribution, and making some straightforward assumptions about travel velocity and path, a simple circular model was constructed. Subsequent theoretical and numerical analyses using a computer program which was developed from the model suggested several important results. There seems good reason to believe that the model, which is based on very modest assumptions and requires vastly less effort to parametrize than the network approach, will generate solutions which compare favorably with more complex models. (Author)
PB-173 684 HC$3.00 MF$0.65

15F. Nuclear Warfare

RADIATION SITUATION AND ACTION OF TROOPS,
Foreign Technology Div Wright-Patterson AFB Ohio
A. D. Moskalev. 26 Apr 67, 88p Rept no. FTD-MT-66-150
TT-67-62510
Edited machine trans. of mono. Radiatsionnaya Obstanovka i Deistviya Voisk, Moscow, 1966 104p.

Descriptors: (*Radiological contamination, *Nuclear weapons), Radiation effects, Radiation injuries, Radiation hazards, Radioactive fallout, Military personnel, Nuclear explosions, Shielding, Nuclear warfare, Decontamination, USSR.

Radioactive contamination considerably differs from other injurious factors of nuclear weapons: it spreads over large areas, acts for prolonged periods, and possesses a specific character of action on humans. How to evaluate the radiation situation, how to act in conditions of radioactive contamination is discussed.
AD-656 563 HC$3.00 MF$0.65

THEORIES OF SOCIAL CHANGE AND THE ANALYSIS OF NUCLEAR ATTACK AND RECOVERY,
Human Sciences Research Inc Mclean Va
For primary bibliographic entry see Field 5K.
AD-656 628 HC$3.00 MF$0.65

15G. Operations, Strategy, and Tactics

PSYCHOLOGICAL OPERATIONS BIBLIOGRAPHY. SUPPLEMENT NO. 6.
Research memo.,
American Univ., Washington, D. C. Special Operations Research Office.
Dennis Gosier. May 65, 51p RM-65-6

Descriptors: (*Psychological warfare, Bibliographies), Political science, Communism, Military strategy, Propaganda, Operations research, Communication systems, Display systems.

Contents: Fundamental elements of psychological operations: Background; Psyops organization and personnel; Psycho-political warfare; Military psychological operations; Psyops techniques; Media and support; Psyops analysis. Historical aspects of psychological operations: Early experiences; World War II experiences; Post World War II experiences.
AD-467 062 HC$3.00 MF$0.65

CINFAC BIBLIOGRAPHIC REVIEW: SUPPLEMENT NO. 13,
American Univ Washington D C Center for Research in Social Systems
Nancy Currier, Heidi Berry, Janet Morse, and Margaret Bittick. May 67, 110p
Contract DA-49-092-ARO-7
See also AD-654 795.

Descriptors: (*Counterinsurgency, Bibliographies), (*Psychological warfare, Bibliographies), (*Unconventional warfare, Bibliographies), Sociology, Political science, Leadership, Guerrilla warfare, Insurgency, Propaganda, History, Reviews, Indexes.

The report consists of a bibliography of unclassified English-language books and articles on counterinsurgency; unconventional warfare; psychological operations; and social, economic, and political background factors. Within each of these subject areas the entries are categorized and cross-referenced by specific problem and area and indexed by author and title. The bibliography also includes book reviews and a bibliographic essay on these subjects. (Author)
AD-656 465 HC$3.00 MF$0.65

LANREZAC, JOPPRE, AND PLAN XVII,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5J.
AD-656 547 Not available from CFSTI.

16. MISSILE TECHNOLOGY

16A. Missile Launching and Ground Support

IMPROVED GROUND-SUPPORT MULTI-CONDUCTOR CABLES FOR MISSILE SYSTEMS.
Frankford Arsenal Philadelphia Pa
For primary bibliographic entry see Field 9A.
AD-656 061 HC$3.00 MF$0.65

GSE CABLE FACT AND FICTION,
Army Missile Command Redstone Arsenal Ala Ground Support Equipment Lab
For primary bibliographic entry see Field 9A.
AD-656 101 HC$3.00 MF$0.65

DEVELOPMENT OF LIGHTWEIGHT GROUND SUPPORT CABLES FOR QUICK REACTION MISSILE SYSTEMS,
Martin Co Baltimore Md
For primary bibliographic entry see Field 9A.
AD-656 180 Not available from CFSTI.

CHECKOUT CABLES FOR AN AIR-TO-SURFACE MISSILE,
North American Aviation Inc Downey Calif Space and Information Systems Div
For primary bibliographic entry see Field 9A.
AD-656 183 HC$3.00 MF$0.65

DESIGN AND APPLICATION OF MISSILE CABLES EMPLOYING LAYTEX INSULATION,
Kaiser Aluminum and Chemical Corp Bristol R I Bristol Works
For primary bibliographic entry see Field 9A.
AD-656 241 HC$3.00 MF$0.65

REPORT OF CORROSION TESTS AND ANALYSIS OF COMPACT HEAT EXCHANGERS,
Army Engineer Research and Development Labs Fort Belvoir Va
For primary bibliographic entry see Field 13A.
AD-656 617 HC$3.00 MF$0.65

16D. Missiles

AN ENVIRONMENTAL HIGH PERFORMANCE, RUGGED SILICONE CABLE DESIGN FOR MISSILE APPLICATION,
Picatinny Arsenal Dover N J Army Explosive Ordnance Disposal Center
For primary bibliographic entry see Field 9A.
AD-656 063 HC$3.00 MF$0.65

AN APPROACH TO OPTIMIZATION OF MISSILE CABLE SYSTEM DESIGN,
Frankford Arsenal Philadelphia Pa
For primary bibliographic entry see Field 9A.
AD-656 182 HC$3.00 MF$0.65

THE APPLICATION OF ELECTRICAL CABLE TO MISSILE SYSTEMS,
Douglas Aircraft Co Inc Santa Monica Calif
For primary bibliographic entry see Field 9A.
AD-656 189 HC$3.00 MF$0.65

A THEORETICAL CONSIDERATION OF STIFFNESS IN AN ELECTRICAL CABLE,
RCA Service Co Alexandria Va
For primary bibliographic entry see Field 9A.
AD-656 232 HC$3.00 MF$0.65

EVALUATION OF MULTICONDUCTOR CABLES USED IN GROUND TO AIR GUIDED MISSILE SYSTEMS,
Frankford Arsenal Philadelphia Pa
For primary bibliographic entry see Field 9A.
AD-656 289 HC$3.00 MF$0.65

SIDESLIP CHARACTERISTICS AT VARIOUS ANGLES OF ATTACK FOR SEVERAL HYPERSONIC MISSILE CONFIGURATIONS WITH CANARD CONTROLS AT A MACH NUMBER OF 2.01.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va. G. V. Foster. Nov 59, 24p NASA-TM-X-134

Descriptors: *Aerodynamic characteristics, *Canard, *Hypersonic vehicle, *Lateral stability and control, *Longitudinal stability and control, *Pressure tube, Aerodynamic, Afterbody, Angle of attack, Characteristics, Configuration, Control, Cruciform, Fin, Flare, Hypersonic, Lateral, Longitudinal, Moment, Pitch, Pressure, Rolling, Sideslip, Stability, Supersonic, Tube, Tunnel, Vehicle, Wing.

For abstract, see STAR 05 18.
N67-31533 HC$3.00 MF$0.65

EXPERIMENTAL INVESTIGATION OF BASE HEATING AND ROCKET HINGE MOMENTS FOR A SIMULATED MISSILE THROUGH A MACH NUMBER RANGE OF 0.8 TO 2.0.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 21H.
For abstract, see STAR 05 18.
N67-31731 HC$3.00 MF$0.65

17. NAVIGATION, DETECTION, COMMUNICATIONS, AND COUNTERMEASURES

17B. Communication

TABULATIONS OF VHF PROPAGATION DATA OBTAINED OVER IRREGULAR TERRAIN AT 20, 50, AND 100 MHZ.
Institute for Telecommunication Sciences and Aeronomy Boulder Colo
For primary bibliographic entry see Field 20N.
AD-655 854 HC$3.00 MF$0.65

FREQUENCY ASSIGNMENT STUDIES.
Quarterly progress rept. no. 6, Feb-Apr 67, Electro Technical Analysis Corp Tucson Ariz
Alfred J. Hoehn, and Thomas W. McCurnin. Jun 67, 75p
ECOM-01232-6
Contract DA-28-043-01232 (E)
See also AD-650 373.

Descriptors: (*Radiofrequency, Scheduling), (*Electromagnetic compatibility, Radio communication systems), (*Radio communication systems, Tactical warfare), Frequency, Military requirements, Mathematical models, Radio receivers, Stochastic processes, Performance (Engineering).

In this report the work on intermodulation protection reported in the Fifth Quarterly is generalized and applied to the basic frequency groups used in the synthesis procedure. A complete assignment is made to a radio relay system to illustrate the full synthesis procedure. An integrated treatment of the radio-net problem is presented along the lines of the radio-relay analysis included in the Fifth Quarterly. Rules for the prevention of interference, and a synthesis procedure for satisfying these rules are included. The a-m detector module of the Evaluation Model is revised to include the effect of inherent receiver noise in addition to the desired and interfering signals entering at the input terminals. The fm model output has been integrated and averaged over the baseband so that its answers also may be presented as a power signal-to-noise ratio for the complete baseband. Based on the signal-to-noise ratios determined from the models, a degradation index has been defined to measure the decrease in performance caused by the interfering signals. The requirement that a confidence statement be placed on the calculation of signal-to-noise ratio and/or degradation index has been met through the use of distribution-free methods of order statistics. A development of the technique and an example of its use are included. (Author)
AD-655 868 HC$3.00 MF$0.65

A STUDY OF TELEMETRY SYSTEMS FOR GUN LAUNCHED UPPER ATMOSPHERE PROBES,
National Research Council of Canada Ottawa (Ontario) Div of Radio and Electrical Engineering
For primary bibliographic entry see Field 9F.
AD-655 874 Not available from CFSTI.

HEIGHT GAIN, LOCATION GAIN, AND CORRELATION IN IRREGULAR TERRAIN AT 20, 50, AND 100 MHz.
Institute for Telecommunication Sciences and Aeronomy Boulder Colo
For primary bibliographic entry see Field 20N.
AD-655 901 HC$3.00 MF$0.65

COMMUNICATION CABLES WITH WELDED AND CORRUGATED METALLIC SHEATHS,
Hackethal-Draht-Und Kabel-Werke Ag Hanover (West Germany)
For primary bibliographic entry see Field 9A.
AD-656 070 HC$3.00 MF$0.65

TELEPRENE DROP WIRE WITH NEW SUPER HIGH STRENGTH COPPERWELD CONDUCTOR,
Whitney Blake Co New Haven Conn
R. H. Dudley, and R. D. Pyle. Nov 62, 7p
Prepared for presentation at the Annual Symposium on Technical Progress in Communication Wires and Cables (11th), Asbury Park, N. J., 28-30 Nov 62. Prepared in cooperation with Copperweld Steel Co., Glassport, Pa.

Descriptors: (*Telephone lines, Performance (Engineering)), Loading (Mechanics), Copper alloys, Steel, Synthetic rubber.

A new super high strength No. 18 Copperweld conductor has been developed. With this an improved parallel Teleprene drop wire having a nominal breaking load of 600 pounds is being produced commercially. This drop wire can be installed in substantially longer spans and with smaller sags than the previous standard drop wire. It has ability to withstand much heavier loads and therefore has greater margin of safety than the older product. The new wire significantly extends the range of conditions under which drop wire can be used satisfactorily. (Author)
AD-656 079 HC$3.00 MF$0.65

A FOAM POLYETHYLENE INSULATED COAXIAL CABLE FOR DIRECT BURIAL ON COMMUNITY TV SYSTEMS,
Northern Electric Co Ltd Montreal (Quebec)
For primary bibliographic entry see Field 9A.
AD-656 120 HC$3.00 MF$0.65

THE CHANGING PATTERN OF TELEPHONE OUTSIDE PLANT,
Bell Telephone Labs Inc Murray Hill N J
W. J. Lally. 1961, 19p

Prepared for presentation at the Annual Wire and Cable Symposium (10th), Asbury Park, N. J., November 29 1961.

Descriptors: (*Telephone lines, Installation), Design, Maintenance, Underground, Plastic coatings, Electric insulation.

Important changes are taking place in the outside plant of the telephone operating companies. The cables that connect the customer's telephone to the local central office are becoming larger and longer. Open wire, which has been typical of outside plant since the beginnings of telephony, is giving way to multiple line wire. There is a growing trend toward buried plant. New techniques (pulse code modulation and remote line concentrators) are coming into use to provide more efficient utilization of copper. Electronic computers are being used as engineering and administrative tools. This article discusses these and other major changes that have been taking place in outside plant during the last decade, and speculates on changes that may lie ahead.
AD-656 162 HC$3.00 MF$0.65

LONG SPAN INSULATED OPEN WIRE TELEPHONE PLANT,
Rural Electrification Administration Washington D C
H. B. Lee, and G. A. Lohsl. 1961, 31p
Prepared for presentation at the Annual Symposium on Technical progress in Communication Wires and Cables (10th), Asbury Park, N. J., November 29, 30 and December 1, 1961.

Descriptors: (*Telephone lines, Rural areas), Installation, Supports, Maintenance, Costs, Polyethylene plastics, Electric insulation, Damping.

The experience gained during the construction and operation of the long span field trial at Tyler, Minnesota, has lead to the development of hardware items and construction practices to be used with this type of plant. These have been very effective in preventing fatigue breaks in the line wire due to wind induced vibrations. On wires of small diameter, it has been necessary to eliminate compression type deadends entirely and to provide preformed shunts for all compression type splices and off-set compression sleeves. Armor rods must be used over the insulated wire at every point of support. The armored, insulated wire is tied at every insulator contact, including all four insulators on point transposition brackets. The above measures relieve stress concentration points caused by compression type fittings and reduce the severe vibrations occurring at the insulators. A high density polyethylene has replaced the low density high molecular weight polyethylene for the line wire insulation. The high density material has greatly reduced the construction problems encountered in handling the low density material. Insulated long span construction is proving to be an economical and reliable type of plant that has great promise for use in nine or ten Midwestern States.
AD-656 166 HC$3.00 MF$0.65

A DUAL-INSULATED TERMINATING CABLE,
Bell Telephone Labs Inc Murray Hill N J
G. H. Webster. 1961, 11p
Prepared for presentation at the Annual Wire and Cable Symposium, Asbury Park, N. J., November 29, 1961.

Descriptors: (*Telephone lines, Plastic coatings), Electric cables, Polyethylene plastics, Electric insulation, Polyvinyl chloride, Design, Electrical properties, Attenuation, Aluminum coatings.

The article describes a 22-gauge terminating cable which consists of: (1) Tinned copper conductors. (2) A dual insulation of natural polyethylene followed by a skin of colored PVC. (3) A core design similar to that of 22-gauge PIC exchange area cables but with sufficient individually color coded interstice pairs to match the odd count complements of pulp and paper insulated cables. (4) A core wrap of polypropylene for small size cables and polyethylene terephthalate for large size cables. (5) An ALVYN sheath consisting of a longitudinally applied shield of corrugated aluminum with an outer jacket of PVC.
AD-656 167 HC$3.00 MF$0.65

LONGITUDINAL APPLICATION OF INSULATION AND SHIELD ON COMMUNICATION CABLES,
Western Electric Co Inc Chicago Ill
H. W. Budenbender. Nov 61, 26p
Prepared for presentation at the Annual Wire and Cable Symposium (10th), at Asbury Park, N. J., 29 Nov-1 Dec 61.

Descriptors: (*Electric cables, Communication equipment), (*Manufacturing methods, Electric cables), Tape wound construction, Electric insulation, Plastic coatings, Aluminum coatings, Polyethylene plastics, Tapes, Plastics, Binders, Films, Extrusion.

After adding all the new sheathing materials and applying them in a longitudinal direction on the new tandemized extrusion line for alpeth cable, some very interesting results were observed. All the above additions were made to the former extrusion line without increasing the number of operators required by simplification of the material splicing and transfer operations and the better utilization of the operators time. In addition, the following economics were derived: (1) Elimination of separate operation of spiral wrapping on a drum type strander by application of all sheathing materials longitudinally in a tandemized extruder line. (2) Elimination of a nylon binding over the plastic type by use of special holddown tooling. (3) Reduction in the number of core trucks required and floor space by combining all sheathing operations in one assembly line. (4) Reduction in production time interval and investment. (5) Reduction in scrap material due to improved designs of fools. (6) Reduction in final sheathing diameter by changes to thickness of materials and method of application.
AD-656 168 HC$3.00 MF$0.65

'QUINA': A SUBMARINE CABLE FOR AUDIO AND CARRIER FREQUENCIES,
Pirelli Spa Milan (Italy)
B. Bortoletto, and R. Monelli. 1961, 7p
Annual Wire and Cable SySymposium (10th), Asbury Park, N. J., Nov 29 and 30 December 1, 1961.

Descriptors: (*Electric cables, Underwater communication systems), Polyethylene plastics, Coaxial cables, Italy, Attenuation, Manufacturing methods, Physical properties.
Identifiers: Quina.

An all-plastic submarine cable capable of carrying simultaneously audio and carrier frequencies, named Quina, is described. The cable core comprises five conductors, namely a polyethylene insulated central copper wire and four curved copper strips, suitably spaced and spirally applied upon the said central insulated conductor; on the four copper strips a polyethylene jacket and finally a copper screening tape are applied. The four small tapes can be used as a symmetrical star quad for audio or low carrier frequencies, and the coaxial pair (having the four tapes as outer conductor and the central wire as inner conductor) for frequencies above say 60 kc/sec; the two systems being used simultaneously if desired. The cable armour can be of the conventional type or of the antitwist type comprising parallel strands embedded in a polyethylene sheath. (Author)
AD-656 179 HC$3.00 MF$0.65

CORRUGATED METALLIC SHEATH FOR COMMUNICATION AND DATA TRANSMISSION CABLES,
Simplex Wire and Cable Co Cambridge Mass
For primary bibliographic entry see Field 9A.
AD-656 181 HC$3.00 MF$0.65

UNARMOURED SUBMARINE CABLE FOR DEEP-SEA CARRIER TELEPHONY,
Submarine Cables Ltd London (England)
A. L. Meyers. Nov 60, 9p
Annual Wire and Cable Symposium (9th), Asbury Park, N. J., 30 Nov 60.

Descriptors: (*Telephone lines, Underwater), (*Coaxial cables, Underwater), Deep water, Installation, Design.

An unarmoured type of deep-sea coaxial cable, with the strength member inside the inner conductor and an external plastic sheath, was proposed in 1951. It gives increased circuit capacity and permits the laying of repeaters in rigid housings for two-way operation. After development and trials, the new cable was chosen for the deep sections of the Canadian transatlantic telephone cable, due for completion in 1961 as the first link in a proposed Commonwealth system around the world. This paper describes the advantages, development and manufacture of the cable, and reviews future possibilities. (Author)
AD-656 192 HC$3.00 MF$0.65

A NEW ANTITWIST ARMOURED SUBMARINE CABLE,
Pirelli Spa Milan (Italy)
G. Palandri, P. Gazzana Priaroggia, and R. Monelli. 1960, 8p
Annual Wire and Cable Symposium (9th), Asbury Park, New Jersey, November 30, December 1-2, 1960.

Descriptors: (*Electric cables, Underwater communication systems), Mechanical properties, Electric insulation, Manufacturing methods, Electrical properties, Design, Attenuation.

This report illustrates the constructional data and the mechanical characteristics of an antitwist armour sheath for deep sea cables are illustrated. The armour consists of steel strands parallel with one another and with the cable axis, embedded in a polyethylene sheath. The results of the test carried out on this cable are also given. (Author)
AD-656 193 HC$3.00 MF$0.65

NEW LOW-LOSS 'BALLOON' TYPE POLYETHYLENE INSULATION FOR TELECOMMUNICATION CABLES,
Societe Anonyme de Telecommunications Paris (France)
For primary bibliographic entry see Field 11G.
AD-656 195 HC$3.00 MF$0.65

A PRESENT AND FUTURE VIEW OF THE FIELD ARMY WIRE AND CABLE REQUIREMENTS,
Army Signal Center and School Fort Monmouth N J
D. T. Patterson. 1967, 13p
Prepared for presentation at Annual Wire and Cable Symposium (9th).

Descriptors: (*Field wire, Military requirements), (*Electric cables, Military requirements), Army equipment, Maintenance, Installation, Electric wire, Communication systems.

Under present and future battlefield concepts there is and will continue to be a high population of electronic emitting devices. Still, sight must not be lost of the fact that radio circuits are susceptible to natural phenomena as well as man-made interference and restrictions. Wire, too, has certain de-

ficiences, the major ones being the logistical support effort and the length of time and manpower required for installation. However, logistics and time in combination often have over-riding roles and for these reasons, perhaps, wire and cable facilities no longer provide the primary transmission medium between major units in the field army. Yet there is still a need for these facilities as a back-up for the high capacity radio circuits. In addition, local telephone service will continue to be best served by wire and cable. Accordingly, it is felt a requirement exists and will continue to exist to provide wire circuits. Improved and wholly compatible wire and cable facilities, concurrent development of splicing techniques and tools, simplified and improved testing techniques, and better installation and recovery method are all areas that must be considered by the wire and cable industry and the military in concert, if the art of providing communications over wire media is to keep abreast of the changing concepts related to the army in the field.
AD-656 206 HC$3.00 MF$0.65

FOUR-WIRE FIELD WIRE,
Army Electronics Labs Fort Monmouth N J
Matthew J. Malinowski, Ralph Cramer, Lillian Platau, and Stanley Lamberton. 1960, 19p
Prepared for presentation at the Annual Wire and Cable Symposium (9th) Asbury Park, N. J., 30 Nov, 1-2 Dec 1960.

Descriptors: (*Field wire, Military requirements), Design, Electric cables, Electric insulation, Polyethylene plastics, Metal coatings, Telephone lines, Performance (Engineering), Joining, Interference, Attenuation.

The paper describes in brief the development of a new four-wire field wire for military use.
AD-656 207 HC$3.00 MF$0.65

EXPERIMENTAL RESULTS OF CELLULAR DIELECTRICS FOR TELECOMMUNICATION CABLES,
Pirelli Spa Milan (Italy)
For primary bibliographic entry see Field 9A.
AD-656 229 HC$3.00 MF$0.65

COLOR STANDARDS FOR PLASTIC INSULATED COMMUNICATION CABLES AND WIRES,
Rural Electrification Administration Washington D C
C. R. Ballard, and W. W. Newman, Jr. 1959, 15p
Annual Wire and Cable Symposium Asbury Park, N. J., December 1, 2, 3, 1959.

Descriptors: (*Telephone lines, Colors), Standards, Electrical properties, Plastic coatings, Electric insulation.

An improvement in cable designs has been color coding of the cable pairs to render each pair readily distinguishable from all other pairs in the cable. This color coding of pairs eliminates the necessity of electrical testing to establish the identity of the pair and consequently substantially increases the speed of splicing. The increased speed is directly evidenced by a reduction of cost for splicing and loading of cables, and placing terminals for distribution purposes. Substantial operational benefits and maintenance savings are obtained where color coding is used.
AD-656 246 HC$3.00 MF$0.65

PLASTIC INSULATED RIBBON CABLE FOR SWITCHBOARD WIRING,
Bell Telephone Mfg Co Antwerp (Belgium)
F. Cools, H. Moons, and J. Wuyts. 1967, 19p

Descriptors: (*Telephone lines, Telephone communication systems), Thermoplastics, Electric insulation, Electric terminals, Dielectric properties, Electric cables, Belgium.

The report discusses the physical and electrical properties of ribbon cable suitable for switchboard wiring in telephone systems. The problem of stripping the ribbon cable is also considered.
AD-656 248 HC$3.00 MF$0.65

SPECIFICATION CHANGES AND NEW DEVELOPMENTS IN CABLE AND WIRE FOR THE RURAL ELECTRIFICATION ADMINISTRATION,
Rural Electrification Administration Washington D C
W. T. Smith, C. R. Ballard, and A. L. Richey. 1954, 54p
Annual Wire and Cable Symposium (3rd), Asbury Park, N. J., December 7, 8, 9, 1954.

Descriptors: (*Telephone lines, Specifications), Joining, Rural areas, Electric terminals, Installation, Electric insulation, Thermoplastics, Plastic coatings, Electric cables, Supports, Design.

Topics included are: Plastic sheath-plastic insulated cable; Splicing; Cable accessories; Rural telephone open wire plant - a new concept.
AD-656 251 HC$3.00 MF$0.65

THE ROLE OF WIRE AND CABLE IN MILITARY COMMUNICATIONS,
Signal Corps Engineering Labs Fort Monmouth N J
For primary bibliographic entry see Field 9A.
AD-656 252 HC$3.00 MF$0.65

MANUFACTURE OF ALUMINUM CONDUCTOR TELEPHONE CABLE,
Western Electric Co Inc Kearny N J
James S. Herbert. 1954, 26p
Prepared for presentation at Symposium on Technical Progress in Communication Wires and Cable, Asbury Park, N. J., December 8, 1954.

Descriptors: (*Telephone lines, Aluminum), Manufacturing methods, Electric cables, Industrial research, Electric insulation.

Topics included are: wire drawing, pulp insulating, twisting, stranding and cabling, drying, sheathing, material handling, rod supply, aluminum conductor joining, and production status.
AD-656 254 HC$3.00 MF$0.65

THE TRANS-ATLANTIC TELEPHONE CABLE,
Bell Telephone Labs Inc Murray Hill N J
M. C. Biskeborn. 1965, 25p

Descriptors: (*Telephone lines, Underwater), Atlantic Ocean, Electric cables, Telephone communication systems.

The article describes the program for laying transatlantic telephone cables in 1955 and 1956.
AD-656 257 HC$3.00 MF$0.65

MECHANICAL SPLICE CLOSURES FOR TELEPHONE CABLES,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 9A.
AD-656 258 HC$3.00 MF$0.65

SELF-SUPPORTING COMMUNICATION CABLES USING COPPERWELD CONDUCTORS,
Copperweld Steel Co Glassport Pa
F. E. Leib, J. V. McBride, and J. R. Ruhlman. 1954, 13p
Prepared for presentation at the Annual Symposium on Technical Progress in Communication Wires and Cables (3rd), Asbury Park, N. J., December 7, 1954. Prepared in cooperation with Plastic Wire and Cable Corp., Jewett City, Conn., and Preformed Line Products, Inc., Cleveland, Ohio.

Descriptors: (*Telephone lines, Supports), Electric cables, Copper, Mounting brackets, Structural properties.

To state the case for self-supporting communication cables, with strength derived from the conductors themselves: there is no doubt that single pair cables, such as telephone drop wire or the well known field wire, have been most successful. Conversely, there would seem to be no doubt that for 100-pair cables, for example, soft copper wires with messenger installation are more economical. In between the 1-pair and 100-pair cables, there is undoubtedly a field for cables with high strength conductors. The range probably includes 6-, 11-, 16-, and 26-pair cables. The designing of suitable attachment fittings has been a most important contribution. The adaptability of Copperweld to copper cable practices has been demonstrated by two manufacturers: rubber-neoprene 6-pair drop wire, 6-pair PVC insulated and jacketed drop wire, and 6-, 11-, 16-, and 26-pair self-supporting cables with polyethylene insulated conductors and PVC jackets.
AD-656 265 HC$3.00 MF$0.65

PRELASHING AERIAL CABLE,
Bell Telephone Labs Inc Murray Hill N J
C. Shafer, Jr. 1967, 6p
Annual Wire and Cable Signal Corps Symposium, December 14, 15, 16, 1953.

Descriptors: (*Transmission lines, Supports), Installation, Electric cables, Steel, Wire.

Several years of intensive effort resulted in the development of prelashing, which provides an improved labor saving method of installing aerial cable. With this method, a roller support is temporarily attached to each pole, the cable and strand are prelashed together and pulled into position under tension and transferred from their roller supports to their permanent attachments, the cable suspension clamps. Each pole need be climbed only twice and some of the trips up and down the line can be eliminated.
AD-656 314 HC$3.00 MF$0.65

FACTORS IN THE SELECTION OF CARRIER SYSTEMS.
Bell Telephone Labs Inc Murray Hill N J
19 Nov 53, 23p

Descriptors: (*Telephone lines, Performance (Engineering)), Transmission lines, Costs, Voice communication systems, Effectiveness, Electric connectors, Electrical networks, Circuits.

The article discusses factors involved in the selection of the type of carrier system which will do the best and most economical job under a particular set of circumstances. The factors involved include such things as costs of lines and repeaters, costs of terminals, number of circuits to be provided for, and flexibility.
AD-656 315 HC$3.00 MF$0.65

MODEL TESTS OF A SURFACE-WAVE TRANSMISSION LINE FOR LONG DISTANCE COMMUNICATION,
Signal Corps Engineering Labs Fort Monmouth N J
For primary bibliographic entry see Field 9A.
AD-656 316 HC$3.00 MF$0.65

THERMOPLASTIC INSULATED AND SHEATHED TELEPHONE CABLE FOR RURAL ELECTRIFICATION ADMINISTRATION TELEPHONE BORROWERS' SYSTEMS,
Rural Electrification Administration Washington D C
A. L. Richey, and J. L. Robb. 1953, 22p

Prepared for presentation at the Annual Symposium Technical Progress in Communication Wires and Cables (2nd), Asbury Park, N. J., December 14, 15, and 16, 1953.

Descriptors: (*Telephone lines, *Plastic coatings), Thermoplastics, Electric insulation, Rural areas, Polyethylene plastics, Specifications.

The article discusses the utilization and specifications of plastic cables for rural telephone systems.
AD-656 320 HC$3.00 MF$0.65

NATURAL AGING OF NEOPRENE JACKETED TELEPHONE DROP WIRE,
Whitney Blake Co New Haven Conn
For primary bibliographic entry see Field 11C.
AD-656 330 HC$3.00 MF$0.65

SPIRAL MULTICOLORED PVC WIRE,
Swiss Insulating Works Ltd Breitenbach
Gerard de Senarclens. 1955, 13p
Annual Wire and Cable Symposium (4th), Asbury Park, N. J., December 6, 7, and 8, 1955.

Descriptors: (*Telephone lines, Plastic coatings), (*Polyvinyl chloride, Electric insulation), Switzerland, Electric wire, Electric cables, Manufacturing methods, Colors.

The paper describes some of the recently achieved improvements in wire insulation used in telephone transmissions, notably in regard to distribution wires, switchboard wires and certain cables.
AD-656 369 HC$3.00 MF$0.65

A USER'S VIEW OF PLASTIC INSULATED CONDUCTORS IN OUTSIDE TELEPHONE PLANT,
Michigan Bell Telephone Co Detroit
R. Foulkrod. Dec 55, 32p
Annual Wire and Cable Symposium (4th), Asbury Park, N. J., 7 Dec 55.

Descriptors: (*Telephone lines, *Plastic coatings), Electric insulation, Installation, Polyethylene plastics, Performance (Engineering).

Plastic insulated conductors were first installed in 1951 in our toll outside plant and in the exchange plant the following year. Subsequently, the use of such insulation was extended to self supporting, sheathless facilities for use in rural and urban areas. The history and development, from the user's viewpoint, of the various applications is discussed under appropriate headings in this paper.
AD-656 372 HC$3.00 MF$0.65

PROTECTION PROBLEMS ON TELEPHONE DISTRIBUTION SYSTEMS,
Bell Telephone Labs Inc Murray Hill N J
J. W. Phelps. 7 Dec 55, 9p
Annual Wire and Cable Symposium (4th), at Asbury Park, N. J., 7 Dec 55.

Descriptors: (*Telephone lines, Plastic coatings), Polyethylene plastics, Polyvinyl chloride, Electric insulation, Lightning, Voltage, Protection, Maintenance, Costs, Electric cables.

The use of polyethylene and polyvinylchloride as conductor insulating and cable sheathing materials has made possible a reduction in the cost of protecting distribution wires and cables from the damaging effects of lightning and commercial power voltages. Since many of the potentials which necessitated protection apparatus on paper insulated conductors will do no harm whatsoever to the plastic insulated conductors, there will be less protector maintenance expense and it is expected there will be less cable trouble. (Author)
AD-656 373 HC$3.00 MF$0.65

POLYETHYLENE-INSULATED TELEPHONE CABLE,
Bell Telephone Labs Inc Murray Hill N J
A. S. Windeler. Dec 55, 12p
Prepared for presentation at the Annual Wire and Cable Symposium (4th), Asbury Park, N. J., 7 Dec 55.

Descriptors: (*Telephone lines, Electric insulation), (*Polyethylene plastics, *Electric insulation), Expanded plastics, Plastic coatings, Physical properties, Electrical properties, Electric cables.

The solid-polyethylene insulation has been introduced into the telephone plant for use where system savings will offset the higher first cost of the cable. The expanded-polyethylene is now the standard insulation for broadband video pairs. In addition, expanded-polyethylene-insulated 19-gauge toll cables are being given extensive field trials. (Author)
AD-656 374 HC$3.00 MF$0.65

RURAL WIRE AND URBAN WIRE FOR TELEPHONE DISTRIBUTION SYSTEMS,
Bell Telephone Labs Inc Murray Hill N J
A. P. Jahn. Dec 55, 20p
Prepared for presentation at the Signal Corps Symposium, Asbury Park, N. J., Dec 55.

Descriptors: (*Telephone lines, Electric cables), Rural areas, Urban areas, Wire, Copper, Supports, Steel, Polyethylene plastics, Electric insulation, Plastic coatings, Polyvinyl chloride.

B Rural Wire consists of six twisted pairs of insulated annealed copper No. 19 AWG (0.036 inch diameter) conductors cabled around an insulated .109 inch extra high strength steel support wire. Each conductor is insulated with polyethylene followed by an outer covering of polyvinyl chloride to provide added toughness during installation and to provide color coding for ring, tip and pair identification. The insulated conductors are twisted into pairs of different twist length to keep down crosstalk. The support wire is insulated with polyethylene which provides adequate electrical breakdown strength between conductors and the steel wire. B Urban Wire consists of 16 twisted pairs of polyvinyl chloride insulated No. 24 AWG annealed copper conductors stranded around an insulated extra high strength .109 inch steel support wire. The insulated support wire is the same as is used for rural wire. The conductors have distinctively colored insulation for pair, ring, and tip identification. The colors for the pairs in numerical sequence one to sixteen are obtained by mating blue, green, brown, and slate successively with white, red, black, and yellow. Thus, each pair has a different color combination from any other pair.
AD-656 375 HC$3.00 MF$0.65

DESIGN OF WIRE AND CABLE FOR DIRECT BURIAL IN RURAL TELEPHONE SYSTEMS OF REA BORROWERS,
Rural Electrification Administration Washington D C
R. S. Bailey, C. R. Ballard, F. F. Farnsworth, and A. L. Richey. 1957, 11p
Annual Wire and Cable Symposium (6th), Asbury Park, N. J., December 3, 4, 5, 1957.

Descriptors: (*Telephone lines, Underground), Rural areas, Design, Electric wire, Electric cables, Costs.

New types of wire and cable have become available, together with more economical methods of installing them which make buried construction competitive with aerial construction where soil conditions are favorable for plowing. This paper discusses wire and cable for direct burial in rural areas.
AD-656 405 HC$3.00 MF$0.65

PROPOSED REA SPECIFICATION FOR THERMOPLASTIC-INSULATED, THERMOPLASTIC SHEATHED CABLES INTENDED FOR DIRECT BURIAL USE IN TELEPHONE SYSTEMS OR REA BORROWERS.
Rural Electrification Administration Washington D C
1967, 13p

Descriptors: (*Telephone lines, Underground), Plastic coatings, Thermoplastics, Electric insulation, Polyethylene plastics, Specifications, Rural areas.

This specification covers the requirements for telephone cable having solid copper conductors, insulated with polyethylene. The insulated conductors are twisted into pairs, the required number of pairs stranded into a cable core, and enclosed in an inner polyethylene sheath or jacket. A metallic shield is applied over the inner sheath, and the whole enclosed in a polyethylene outer sheath or jacket. (Author)
AD-656 406 HC$3.00 MF$0.65

BURIED RURAL TELEPHONE DISTRIBUTION SYSTEMS,
Southern Bell Telephone and Telegraph Co Atlanta Ga
D. G. Wilson. Dec 57, 13p
Annual Wire and Cable Symposium (6th), Asbury Park, New Jersey, December, 1957.

Descriptors: (*Telephone lines, Underground), Rural areas, Costs, Installation, Loading (Mechanics), Polyethylene plastics.

Southern Bell's use of buried PIC cable and underground wire for rural distribution plant is discussed. Analyses indicate that 'inplant' cost of buried PIC cable is from 15% to 30% less than that of equivalent aerial plant, exclusive of pole line costs. Moreover, plowing was found feasible in much more difficult terrain than was originally thought possible, and the trouble incidence is very low.
AD-656 407 HC$3.00 MF$0.65

COMMUNICATION UNDERGROUND DISTRIBUTION PLANT IN URBAN AREAS,
Illinois Bell Telephone Co Chicago
C. H. Elder. 1957, 12p
Annual Wire and Cable Symposium (6th), Asbury, N. J., December 1957.

Descriptors: (*Telephone lines, Urban areas), Installation, Underground, Costs.

Based on trials it is concluded that only modest improvements in trenching and backfilling equipment and construction methods are needed to make all underground telephone plant, urban and rural, as cheap as aerial installations. Even if this were not so, the savings in maintenance costs, public demand for better appearance, and greater safety will prove in buried plant.
AD-656 409 HC$3.00 MF$0.65

EXPERIENCES WITH SELF-SUPPORTED PLASTIC COMMUNICATION CABLE,
General Telephone Co of Illinois Springfield
M. O. Brown. 1957, 79p
Annual Wire and Cable Symposium (6th), Asbury Park, New Jersey, December 3, 4 and 5, 1957.

Descriptors: (*Telephone lines, Plastic coatings), Electric insulation, Plastics, Installation, Costs, Maintenance, Rural areas, Design, Standardization.

The trial use of self-supported plastic cable for rural area telephone operations is discussed. Factors and intangibles that enter into the use of self-supported plastic cables show that its use would

be economical even though the service life would not exceed 5 or 10 years. Self-supported plastic cable is one of the most economical means of providing additional rural facilities. This type of plant has been proved to be easily installed, requires less maintenance than any other type of comparable facility and can be expediently removed and fully salvaged in the event service requirements increase beyond its capacity.
AD-656 410 HC$3.00 MF$0.65

A FIELD STUDY OF THE SHEAR TYPE SEALING CONNECTOR,
Minnesota Mining and Mfg Co St Paul
For primary bibliographic entry see Field 9A.
AD-656 412 HC$3.00 MF$0.65

AN EXPERIMENT IN BASIC AIRBORNE ELECTRONICS TRAINING. PART II. EFFECT OF REDUCTION IN TRAINING TIME UPON KNOWLEDGE OF RADAR MAINTENANCE.
Naval Personnel Research Activity San Diego Calif
For primary bibliographic entry see Field 5J.
AD-656 436 HC$3.00 MF$0.65

COMMUNICATION NETWORKS WITH SPECIFIED SURVIVABILITY,
Illinois Univ Urbana Coordinated Science Lab
David E. Butler. Jul 67, 40p Rept no. R-359
Contract DA-28-043-AMC-00073 (E), Grant NSF-GK-690

Descriptors: (*Communication systems, *Electrical networks), Design, Operation, Reliability (Electronics), Graphics, Theorems, Operations research.

The paper considers the problem of the survivability of communication networks from the point of view of graph theory. Stations are represented by nodes of a graph and communication links between stations are represented by edges of a graph. The strength of a graph is defined with respect to nodes only, edges only, and both nodes and edges. Two methods of constructing graphs with specified strength are derived. Planar graphs are studied and a bound on their strength is found. Methods of finding the strength of an arbitrary graph are given. (Author)
AD-656 451 HC$3.00 MF$0.65

STUDY AND ANALYSIS OF SPEECH PARAMETERS AND BANDWIDTH COMPRESSION TECHNIQUES.
Georgia Inst of Tech Atlanta Engineering Experiment Station
For primary bibliographic entry see Field 9D.
AD-656 478 HC$3.00 MF$0.65

ELECTRON ATTACHING ADDITIVES FOR THE MODIFICATION OF RE-ENTRY PLASMAS,
Space Sciences Inc Waltham Mass
For primary bibliographic entry see Field 22B.
AD-656 494 HC$3.00 MF$0.65

INSULATED PARALLEL CIRCUIT WITH AIR DIELECTRIC FOR RURAL TELEPHONE SERVICE,
Rural Electrification Administration Washington D C
W. T. Smith, C. R. Ballard, and R. S. Bailey. Dec 56, 13p
Annual Wire and Cable Symposium (5th) at Asbury Park, N. J., 4-5 Dec 56.

Descriptors: (*Telephone lines, Supports), Installation, Rural areas, Electric insulation, Costs, Electric wire, Electric cables, Performance (Engineering), Attenuation.

The need for open wire circuits in rural areas will prevail for the foreseeable future. The use of bare wire for such circuits has many disadvantages which can be offset by using individually insulated wires. In addition, insulated wires would permit changes in design with substantial additional benefits. Field trial data with the insulated wire and new types of support are encouraging to date. Field trials on an increasing scale are progressing. Net increases in first cost because of the present costs of insulating the wires is an obstacle to widespread use of this type of construction in spite of the tangible and intangible benefits in operation and maintenance. While first costs comparisons are not favorable, it is expected that there will be many situations where elimination of hits, improvement in the leakage characteristics, resistance to corrosion and freedom from effects of foliage will easily prove it in over bare wire. Experience in these situations will permit determination of specific information on savings in operation and maintenance. It is clear that the differences in cost are sufficently close that only minor savings in costs of operations and maintenance are needed for insulated wire to be more economical than bare wire on an annual cost basis. (Author)
AD-656 506 HC$3.00 MF$0.65

C RURAL WIRE,
Bell Telephone Labs Inc Murray Hill N J
A. P. Jahn. 1956, 7p
Annual Wire and Cable Symposium (5th), Asbury Park, N. J., December 5, 1956.

Descriptors: (*Telephone lines, Rural areas), Electric cables, Supports, Design, Polyethylene plastics, Plastic coatings, Electric insulation, Performance (Engineering).

C Rural Wire is intended principally for aerial distribution plant in rural exchange areas and was produced for use in locations where one or two pairs of open wire on brackets would otherwise be used. When C Rural Wire is installed in coastal areas, it offers greatly improved insulation resistance and resistance to corrosion. When used in wooded areas, the amount of tree trimming required will be greatly reduced as compared with that required for open wire. The wire has physical characteristics such that it can be used in spans of 350, 450 and 600 feet in heavy, medium, and light storm loading areas respectively, as recommended for standard 109H Steel Line Wire. Its electrical characteristics are such that, where carrier transmission is not anticipated, it can generally be used in exchange plant as though it were 19 gauge exchange cable or open wire. The wire consists of two parallel No. 14 AWG (.064 inch) 30% conductivity, extra high strength copper-steel conductors insulated with polyethylene. The polyethylene is an insulating grade compounded for outdoor use, of high molecular weight and with about 2-1/2% carbon black. The finished wire is flat-oval shaped with semi-circular edges and opposite flat parallel faces as illustrated in Fig. 1. A single ridge is molded in the insulation on one edge to provide conductor identification. The dimensions of the flat oval are approximately 0.15 inch x 0.28 inch on the minor and major axes respectively. The separation between conductor centers is approximately 0.140 inch. The thickness of insulation is 0.035 inch minimum.
AD-656 508 HC$3.00 MF$0.65

A SEALING CONNECTOR FOR SMALL INSULATED CONDUCTORS,
Minnesota Mining and Mfg Co St Paul
For primary bibliographic entry see Field 9A.
AD-656 517 HC$3.00 MF$0.65

SCAN RECORDING AND RESCAN IN COLOR.
Chiba Univ (Japan) School of Medicine
For primary bibliographic entry see Field 6L.
AD-656 530 HC$3.00 MF$0.65

VOICE COMMUNICATION: RETENTION OF IMPROVED INTELLIGIBILITY,
Purdue Research Foundation Lafayette Ind
J. C. Kelly, and T. D. Hanley. 31 Jan 48, 22p
Rept no. 5
Contract N6ori-104 (02)
See also AD-638 351.

Descriptors: (*Speech, Intelligibility), (*Speech transmission, Training), Retention, Voice communication systems, Training devices, Performance tests, Noise, Experimental design, Performance (Human).

The purpose of this study was to investigate the retention of improved intelligibility for voice communications. The subjects included 176 male undergraduate students at Purdue University, 99 of whom were designated experimental and 77 control. The basic experimental design included the following steps: (A) a pre-training test, including all subjects, experimental and control; (B) a training period for the experimental subjects only, involving one hour of training in loudness and one hour of training in clearness; (C) a post-training test; and (D) re-tests, following the post-training test at intervals of 65 and 100 days. The following results were obtained: (a) Subjects given training maintained superiority over untrained subjects by a margin statistically significant after 65 days and 100 days. (b) Although differences related to type of training can be demonstrated immediately after training, these differences did not persist for 100 days. (c) Training, regardless of type and degree of noise barrier, was more effective than no training at all. (Author)
AD-656 629 HC$3.00 MF$0.65

EFFECT OF LEVEL OF DISTRACTING NOISE UPON SPEAKING RATE, DURATION, AND INTENSITY.
Technical rept.,
Purdue Research Foundation Lafayette Ind
T. D. Hanley, and G. L. Draegert. 24 Jun 49, 21p
SPECDEVCEN-104-2-14
Contract N6ori-104 (01)

Descriptors: (*Speech, Intelligibility), (*Speech transmission, Training), Voice communication systems, Noise, Intensity, Performance (Human).

An experiment was conducted to investigate the effect of four levels of distracting noise upon the following speech variables: (a) words per minute; (b) relation of speech time to total time; (c) mean syllable duration; (d) mean speech intensity level above an arbitrary reference level. The subject's judgment of perceived loudness of the barrier signal also was investigated.
AD-656 630 HC$3.00 MF$0.65

VOICE COMMUNICATION: EFFECT OF STRESS ON TALKERS, A PERSONALITY STUDY,
Purdue Research Foundation Lafayette Ind
Jane S. Harris. 22 Oct 48, 14p
SPECDEVCEN-104-2-11
Contract N6ori-104 (02)

Descriptors: (*Speech, Intelligibility), (*Speech transmission, Stress (Psychology)), (*Personality, Speech), Projective techniques, Personality tests.

The purpose of the present study was to discover any aspects of personality as measured by the Rorschach Test and the Minnesota Multiphasic Personality Inventory which tend to be related to loss in intelligibility under stress conditions.
AD-656 631 HC$3.00 MF$0.65

SHORT-TERM AND AVERAGED CHARACTERISTICS OF NONRECIPROCAL HF IONOSPHERIC PATHS.

Defence Research Telecommunications Establishment Ottawa (Ontario)
For primary bibliographic entry see Field 20N.
AD-656 676 Not available from CFSTI.

PROJECT MAPOLE (MAGNETIC DIPOLE SPARK TRANSMITTER).
Technical note,
Massachusetts Inst of Tech Lexington Lincoln Lab
Marcel P. Fraser. 22 May 67, 42p Rept no. TN-1967-24
ESD-TR-67-265
Contract AF 19 (628)-5167

Descriptors: (*Pulse generators, Very high frequency), (*Radio transmitters, Very high frequency), Capacitors, Gas discharges, Sparks, Radiofrequency power, Ultraviolet radiation, Trigger circuits, Magnets.
Identifiers: MAPOLE project, Spark transmitters.

The report describes theoretical and experimental work on the development of a VHF high-power closed-ring spark transmitter, a device theoretically capable of producing gigawatt peak powers in the nanosecond pulse-length region. The investigation and the report were conveniently divided into three distinct, though interrelated, categories: First, the theoretical aspects of transmitter performance; second, an investigation of certain aspects of spark-gap performance germane to the entire undertaking; finally, the construction and experimental evaluation of the complete transmitter. (Author)
AD-656 706 HC$3.00 MF$0.65

EARTH CONVERAGE FROM A CIRCULARLY SYMMETRIC SHAPED-BEAM ANTENNA ON A SYNCHRONOUS SATELLITE.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 9F.
AD-656 707 HC$3.00 MF$0.65

STUDY OF CW GASEOUS LASERS FOR SPACE COMMUNICATIONS SEMIANNUAL STATUS REPORT, 1 JUL. - 30 NOV. 1966.
Rochester Univ., N. Y. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 20E.
For abstract, see STAR 05 18.
N67-31738 HC$3.00 MF$0.65

PARAMETRIC ANALYSIS OF MICROWAVE AND LASER SYSTEMS FOR COMMUNICATION AND TRACKING QUARTERLY REPORT, 6 AUG. - 6 NOV. 1965.
Hughes Aircraft Co., Culver City, Calif. Aerospace Group.
30 Nov 65, 129p NASA-CR-74989, P65-149
Contract NAS5-9637

Descriptors: *Gas laser, *Microwave, *Optical maser, *Space communication, *Tracking system, Analysis, Communication, Deep, Equation, Gas, Graph, Handbook, Laser, Maser, Optical, Parameter, Space, System, Telecommunication, Tracking.

For abstract, see STAR 05 18.
N67-32164 HC$3.00 MF$0.65

PARAMETRIC ANALYSIS OF MICROWAVE AND LASER SYSTEMS FOR COMMUNICATION AND TRACKING QUARTERLY REPORT, 6 MAR. - 6 JUN. 1966.
Hughes Aircraft Co., Culver City, Calif. Aerospace Group.
Jun 66, 387p NASA-CR-77943, P66-135
Contract NAS5-9637

Descriptors: *Communication system, *Laser, *Microwave transmission, *Space communication, *Tracking system, Acquisition, Analysis, Atmospheric, Background, Communication, Data, Microwave, Mission, Modulator, Optical, Parameter, Power, Propagation, Radiation, Reference, Source, Space, System, Tracking, Transmission.

For abstract, see STAR 05 18.
N67-32165 HC$3.00 MF$0.65

PARAMETRIC ANALYSIS OF MICROWAVE AND LASER SYSTEMS FOR COMMUNICATION AND TRACKING QUARTERLY REPORT, 6 JUN. - 6 SEP. 1966.
Hughes Aircraft Co., Culver City, Calif. Aerospace Group.
6 Sep 66, 410p NASA-CR-82101, P66-213
Contract NAS5-9637

Descriptors: *Laser communication, *Microwave apparatus, *Optical tracking, *Space communication, Acquisition, Analysis, Antenna, Apparatus, Coding, Communication, Design, Detector, Frequency, Laser, Microwave, Modulation, Optical, Parameter, Performance, Radio, Space, System, Theory, Tracking.

For abstract, see STAR 05 18.
N67-32166 HC$3.00 MF$0.65

PARAMETRIC ANALYSIS OF MICROWAVE AND LASER SYSTEMS FOR COMMUNICATION AND TRACKING QUARTERLY REPORT, 6 SEP. - 6 DEC. 1966.
Hughes Aircraft Co., Culver City, Calif. Aerospace Group.
6 Dec 66, 373p NASA-CR-87062, P67-09
Contract NAS5-9637

Descriptors: *Communication system, *Deep space, *Ground station, *Optics, *Tracking system, Analysis, Bibliography, Communication, Data, Deep, Ground, Laser, Methodology, Microwave, Mission, Optimum, Parameter, Power, Receiving, Reference, Space, Station, System, Tracking.

For abstract, see STAR 05 18.
N67-32167 HC$3.00 MF$0.65

CONCEPTUAL MECHANIZATION STUDIES FOR A HORIZON DEFINITION SPACECRAFT COMMUNICATIONS AND DATA HANDLING SUBSYSTEM.
Honeywell, Inc., Minneapolis, Minn. Systems and Research Div.
D. J. Hartman, J. Kahnke, and R. J. Kirk. May 67, 209p NASA-CR-66381
Contract NAS1-6010

Descriptors: *Data handling system, *Horizon project, *Spacecraft communications system, *Subsystem, Acquisition, Communications, Concept, Data, Definition, Earth, Handling, Infrared, Measurement, Mechanization, Network, Spacecraft, System, Tracking.

For abstract, see STAR 05 18.
N67-32625 HC$3.00 MF$0.65

QUARTERLY RADIO NOISE DATA, MARCH, APRIL, MAY 1966,
Institute for Telecommunication Sciences and Aeronomy, Boulder, Colo.
W. Q. Crichlow, R. T. Disney, and M. A. Jenkins. Jun 67, 51p ITSA-18-30
IER-18

Descriptors: (*Noise (Radio), Reports), Atmosphere, Frequency, Measurement, Recording systems, Antennas, Periodic variations, Tables.

A number of radio noise recording stations are operated in a program coordinated by the Environmental Science Services Administration. Measurement results are given as month-hour and time block median and decile values. The parameters recorded are the noise power expressed in terms of an effective antenna noise factor, fa, and the mean voltage and mean logarithm expressed as deviations, Vd, and Ld, in dB below the average power. No systematic statistical editing of the records has been attempted in this publication. The data should be used, realizing the values given may reflect levels of atmospheric noise, man-made noise, or station interference. (Author)
PB-175 662 HC$3.00 MF$0.65

PATH INTERMODULATION DISTORTION MEASUREMENTS OF NOISE-POWER-RATIO OVER TROPOSPHERIC BEYOND-THE-HORIZON PATHS EMPLOYING AN FDM-FM SYSTEM,
Institute for Telecommunications Sciences and Aeronomy, Boulder, Colo.
S. Murahata, and R. E. Skerjanec. Jul 67, 68p
ITSA-41
IER-41

Descriptors: (*Troposphere, Noise (Radio)), (*Noise (Radio), Measurement), Distortion, Radio transmission, Frequency modulation, Networks, Mountains, Parabolic antennas, Transmitter-receivers, Periodic variations.

A program involving noise-power-ratio measurements was conducted to obtain propagation data for evaluating the path contribution to the intermodulation distortion of an over-the-horizon tropospheric scatter test circuit in the Colorado high plains region. The resulting data are compared with data obtained earlier over another path and with the predictions for both paths. The report describes the equipment and physical arrangement used in the test program and presents the results in some detail. (Author)
PB-175 680 HC$3.00 MF$0.65

17E. Infrared and Ultraviolet Detection

DETECTOR INVESTIGATION FOR 8-15 AND 100-4000 MICRON REGIONS.
Final rept. no. 24, 1 Jul 65-30 Jun 67,
Naval Research Lab Washington D C
H. Shenker. 26 Jul 67, 44p Rept no. NRL-MR-1799
ARPA Order-269-62

Descriptors: (*Infrared detectors, *Semiconductor devices), Germanium, Crystal lattice defects, Impurities, Indium antimonides, Magneto-optic effect, Bolometers, Semiconducting films, Epitaxial growth, Zone melting, Encapsulation, Radiometers.
Identifiers: Cadmium arsenides.

Accomplishments in the following areas are summarized: impurity levels in germanium; magneto-optic effects in indium antimonide; Be-doped germanium detectors; preparation of Cd3As2 epitaxial films; Se-doped InSb Rollin detectors sensitive to wavelengths as short as 80 microns; magnetically tuned InSb detectors; liquid encapsulation method of zone refining; superheterodyne infrared radiometer systems. The report covers the work done during the period 1 Jan 67 to 30 Jun 67 only; for previous work see AD-628 870, AD-639 223, and AD-646 927.
AD-656 482 HC$3.00 MF$0.65

COMPARISON OF THE 3 TO 5 AND 8 TO 13 MICRON BANDS FOR TERRAIN RECONNAISSANCE, AND OPTIMIZATION OF OTHER PARAMETER VALUES,
Rand Corp Santa Monica Calif
L. G. Mundie. Jul 67, 16p Rept no. P-3580

Presented at the Infrared Information Symposium (15th), San Francisco, California, May 17-19, 1967.

Descriptors: (*Terrain intelligence, Infrared detectors), (*Aerial reconnaissance, Infrared detectors), (*Infrared detectors, Selection), Semiconductor devices, Germanium, Mercury, Indium antimonides, Atmospheric temperature, Humidity, Signal-to-noise ratio, Infrared film, Infrared images, Resolution.

The relative merits of utilizing the 3 to 5 and 8 to 13 micron atmospheric windows for passive infrared reconnaissance have long been debated by the infrared community. In an effort to provide a firm basis for a discussion of this problem, the paper compares the calculated signal-to-noise values to be expected with presently available detectors operating in these wavelength regions as a function of target temperature for three atmospheric paths. The results are discussed in the light of the imagery that has been acquired utilizing the two windows, and conclusions are drawn concerning the source of seeming discrepancies. Finally, recommendations are made concerning the optimization of equipment parameter values for accomplishing specific reconnaissance objectives. (Author)
AD-656 699 HC$3.00 MF$0.65

DESIGN AND DEVELOP FAST SCAN INFRARED DETECTION AND MEASURING INSTRUMENT. PHASE IV - EXPERIMENTAL STUDY.
Raytheon Co., Wayland, Mass. Advanced Development Lab.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 05 18.
N67-31723 HC$3.00 MF$0.65

17G. Navigation and Guidance

RADIOISOTOPE TAXI GUIDANCE SYSTEM PHASE I. FEASIBILITY STUDY.
Final rept.,
Parametrics Inc Waltham Mass
B. Sellers, J. Hunerwadel, and C. Ziegler. Mar 67, 74p
FAA-RD-67-18
Contract FA-65-WA-1334

Descriptors: (*Taxiing, Guidance), (*Guidance, Radioactive isotopes), Feasibility studies, Gamma counters, Collimators, Runways, Costs, Position finding, Pipes, Krypton, Safety.

Methods utilizing radioisotopes as an integral part of an all weather, zero visibility, ground guidance system have been evaluated. The most promising technique has been selected and examined in detail both theoretically and experimentally and a system design is presented. The method employs a stationary avionic gamma ray detector enclosed by a rotating collimator, which senses the position of the aircraft relative to a radioisotopic line source of radiation buried beneath the runway centerline. The avionic unit, approximately one cubic foot in volume, can be mounted in the interior of the aircraft and no structural modifications of the aircraft are required. The information displayed for the pilot is the position of the aircraft relative to the centerline, with an accuracy of better than plus or minus 5 feet at the centerline. The standard radarscope can be used as a display. A key feature of the system is that it uses a chemically inert radioactive gas, krypton-85, which is deployed in the pipe laid in the runway. When not in use the gas can be removed from the runway using conventional gas handling and pumping apparatus. Radiation safety aspects of an operational system have been examined and found to present no hazard beyond normal industrial practice. An additional feature of the radioisotope system is that it can form the basis of an aircraft location and ground control system. The estimated total installation cost of the ground guidance system in a typical airport (Dulles) is about $41,000. The avionic units will cost between $2,300 and $3,300. (Author)
AD-655 922 HC$3.00 MF$0.65

RESEARCH DIRECTED TOWARD REFINEMENT OF GEODETIC TECHNIQUES UTILIZING TERRESTRIAL AND SPATIAL CONFIGURATIONS.
Georgetown Coll Washington D C Observatory
For primary bibliographic entry see Field 3A.
AD-655 933 HC$3.00 MF$0.65

DETECTION OF CHANGES IN CHARACTERISTICS OF A GAUSS-MARKOV PROCESS.
Harvard Univ Cambridge Mass Div of Engineering and Applied Physics
For primary bibliographic entry see Field 12A.
AD-656 043 HC$3.00 MF$0.65

BASIS OF INERTIAL NAVIGATION,
Foreign Technology Div Wright-Patterson AFB Ohio
A. A. Yakushenkov. 4 May 67, 159p Rept no. FTD-MT-65-189
TT-67-62509
Edited machine trans. of mono. Osnovy Inertsialnoi Navigatsii, Moscow, 1963 146p.

Descriptors: (*Inertial navigation, Textbooks), Theory, Gyroscopes, Kinematics, Instrumentation, Stabilization systems, Accelerometers, Integrators, Automatic pilots, Ships, USSR.

The work expounds the bases of the theory of inertial systems designed for naval navigation, the principle of action of their component elements and questions of long-term development of inertial navigation for the naval fleet. As the basis of the book there are the somewhat expanded and consideration is given to the kinematics of systems of inertial navigation, oriented in certain coordinate systems, which are of interest for the naval fleet, composed of block diagrams of inertial reference-points in these coordinate systems; also considered are certain specific errors of naval inertial systems, and principles are presented of automatic pilotage using inertial systems.
AD-656 562 HC$3.00 MF$0.65

EVALUATION OF CENTERLINE-LIGHTING INDICATIONS FOR RUNWAY-DISTANCE REMAINING AND TAXIWAY EXITS.
California Univ Berkeley Inst of Transportation and Traffic Engineering
For primary bibliographic entry see Field 1E.
AD-656 594 HC$3.00 MF$0.65

CONCEPTUAL MECHANIZATION STUDIES FOR A HORIZON DEFINITION SPACECRAFT ATTITUDE CONTROL SUBSYSTEM, PHASE A, PART II, 10 OCTOBER 1966 - 29 MAY 1967.
Honeywell, Inc., Minneapolis, Minn. Systems and Research Div.
D. J. Hartman, H. A. Knudtson, Jr., C. G. Senechal, E. L. Tesch, and N. W. Tidwell. May 67, 140p
NASA-CR-66382
Contract NAS1-6010

Descriptors: *Infrared horizon, *Satellite attitude control, *Spin stabilization, Absorption, Attitude, Band, Body, Carbon dioxide, Control, Earth, Free, Horizon, Infrared, Mapping, Motion, Profile, Radiance, Satellite, Spacecraft, Spin, Stabilization, Subsystem.

For abstract, see STAR 05 18.
N67-32090 HC$3.00 MF$0.65

A THEORY OF MANUAL SPACE NAVIGATION.
Montana State Coll., Bozeman.
K. Nordtvedt, Jr., Jul 67, 83p NASA-CR-841
Contract NGR-27-001-015

Descriptors: *Linear equation, *Space navigation, Accuracy, Application, Equation, Estimation, Linear, Manual, Navigation, Observation, Orbit, Parameter, Redundancy, Space, Theory.

For abstract, see STAR 05 18.
N67-32486 HC$3.00 MF$0.65

ELECTRONIC POSITIONING SYSTEMS FOR SURVEYORS.
Coast and Geodetic Survey, Rockville, Md. Engineering Div.
For primary bibliographic entry see Field 8E.
PB-175 604 HC$3.00 MF$0.65

17I. Radar Detection

PROCEEDINGS OF THE MITRE TRACKING SYMPOSIUM.
Mitre Corp., Bedford, Mass.
29 Sep 59, 129p SR-7
ESD-TDR-63-414-Vol-2

Descriptors: (*Tracking, Symposia), Abstracts, Reports, Radar tracking, Guidance, Simulation, Aerial reconnaissance, Range finding, Information theory.

The proceedings of the MITRE Tracking Symposium included all papers orally presented and five papers submitted only for publication. This volume includes the unclassified papers. The papers are numbered in order of presentation at the Symposium. (Author)
AD-418 018 HC$3.00

DISTRIBUTIONS OF RADAR ECHOES OVER THE UNITED STATES.
Air Force Surveys in Geophysics No. 191,
Air Force Cambridge Research Labs L G Hanscom Field Mass
Donald D. Grantham, and Arthur J. Kantor. Apr 67, 365p Rept no. AFCRL-67-0232

Descriptors: (*Radar echo areas, United States), (*Meteorological radar, Periodic variations), Stratosphere, Clouds, Diurnal variations, Tables, Networks, Climatology.

The frequency and probability of radar echoes of convective clouds over the United States are presented. Analysis of three years of observations from a 31-station WSR-57 weather radar network indicates that at all altitudes, radar echo probabilities are greatest over Florida and the Gulf coast, generally decreasing northward over the United States. Also, largest probabilities for most layers and locations occur in summer. Echoes have been reported up to at least 70 kft in May, June, and July, and up to 60 kft in winter. Diurnal variations reveal greatest probabilities between 1600 and 2100 LST in all regions. Largest mean monthly 3-hour values are 85 percent, and the maximum mean daily range is roughly 65 percent in the southeast during the summer months. The probability of an echo-free horizontal view near the earth's surface for a 100-mile range is also presented. Tabulations of echo-free sectors, as percent of the 360-degree radar scope, show that the probability of obstructions to a horizontal view increases generally from northwest to southwest during all seasons. The probability of having no echoes is greater in winter than in summer except along the Pacific coastal region. Diurnal variability is larger in July than in January. (Author)
AD-656 310 HC$3.00 MF$0.65

RESULTS OF MAIN ROTOR RADAR BLADE FLIGHT TESTS, MODEL UH-1B, S/N AF622023,

Bell Helicopter Co Fort Worth Tex
For primary bibliographic entry see Field 1C.
AD-656 438 HC$3.00 MF$0.65

HELICOPTER ROTOR BLADE RADAR ANTENNA,
Bell Helicopter Co Fort Worth Tex
For primary bibliographic entry see Field 1C.
AD-656 439 HC$3.00 MF$0.65

HIGH POWER, LOW NOISE PULSE CABLE,
Signal Corps Engineering Labs Fort Monmouth NJ
For primary bibliographic entry see Field 9A.
AD-656 503 HC$3.00 MF$0.65

INDICATORS OF SURVEY RADAR STATIONS,
Foreign Technology Div Wright-Patterson AFB Ohio
A. S. Magdesiev, and M. M. Reznik. 18 Apr 67, 103p Rept no. FTD-MT-65-254
TT-67-62507
Edited machine trans. of mono. Indikatory Obzornykh Radiolokatsionnykh Stantsii, Moscow, 1963 128p.

Descriptors: (*Radar stations, *Radar scanning), Sensitivity, Radar tracking, Electronic scanners, Radar equipment, Identification systems, USSR.

The brochure describes the principles of construction and operation of the main units of indicators used for scanning radar stations, the technical characteristics of the indicator apparatus, and also the influence of these characteristics on the tactical features of the radar stations. The brochure contains also some recommendations on the operation of indicator units, and is intended for students in military academies, officers specializing in radio, and for a wide circle of readers interested in radar techniques. (Author)
AD-656 560 HC$3.00 MF$0.65

A RATE OF TURN DEVICE FOR USE WITH THE 15-J-4-q MOVING RADAR TARGET GENERATOR: ITS DESIGN AND EVALUATION.
Technical rept.,
New York Univ N Y
D. J. Capuano, G. J. Fox, and S. Veniar. 11 Mar 53, 22p
SPECDEVCEN-279-3-9
Contract N6onr-279 (03)

Descriptors: (*Radar targets, *Simulators), Design, Instrumentation, Effectiveness, Aircraft.
Identifiers: Rate-of-turn devices, Evaluation.

The report describes the development, design and evaluation of a rate-of-turn device for use with a radar target generator. To demonstrate the relative effectiveness of this device in air-intercept problems, a laboratory comparison with another model (15-J-4-s) is included. Although the two devices differ somewhat in their design features, there is sufficient overlap in their functions to warrant this comparison and thus, arrive at recommendations for future models based on the limitations and advantages of both devices. Performance results obtained suggest the following recommendations: (1) Time per order can be reduced by decreasing the number of motions required by the operator to complete the order. The difference between the two devices in the average time per order was 2.4 seconds. (2) Lag should be reduced to a minimum. There is a minimum difference of 7.2 seconds lost by the 15-J-4-s device before the course indicator pointer begins to turn for a course change. (3) Rotating the dial instead of the pointer should improve accuracy since the moving dial can be read at a definite point at all times. (Author)
AD-656 634 HC$3.00 MF$0.65

DYNAMIC EVALUATION OF RADAR AND PHOTO TRACKING SYSTEMS,
Atmospheric Sciences Lab White Sands Missile Range N Mex
For primary bibliographic entry see Field 4A.
AD-656 738 HC$3.00 MF$0.65

17J. Seismic Detection

CRUSTAL STUDIES CONTINUATION OF BASIC RESEARCH IN CRUSTAL STUDIES.
Texas Instruments Inc Dallas Science Services Div
For primary bibliographic entry see Field 8K.
AD-656 778 HC$3.00 MF$0.65

18. NUCLEAR SCIENCES AND TECHNOLOGY

18A. Fusion Devices (Thermonuclear)

THE LIVERMORE L EQUALS 2 STELLARATOR,
Princeton Univ., N. J. Plasma Physics Lab.
George V. Sheffield, and John L. Johnson. Feb 67, 12p
Contract AT (30-1)-1238

Descriptors: (*Plasma medium, *Nuclear physics laboratories), Confinement, Configuration, Stagnation point, Electron guns, Thermonuclear reactions.

For abstract, see NSA 21 15.
MATT-530 HC$3.00 MF$0.65

ORNL TARGET PLASMA PROGRAM,
Oak Ridge National Lab., Tenn.
R. A. Dandl, G. F. Guest, and N. H. Lazar. Apr 67, 20p
Contract W-7405-eng-26

Descriptors: (*Thermonuclear reactions, *Plasma physics), Configuration, Scattering, Electrons, Cyclotrons, Heating, Injection.

For abstract, see NSA 21 15.
ORNL-4080 HC$3.00 MF$0.65

REPORT OF AD HOC PANEL ON SCYLLAC.
Division of Technical Information Extension (AEC) Oak Ridge, Tenn.
Jul 66, 74p

Descriptors: (*Thermonuclear reactions, *Plasma physics), (*Decision making, *Nuclear engineering).

For abstract, see NSA 21 15.
TID-23705 HC$3.00 MF$0.65

CHERENKOV TRAPPING OF CURRENT LOOPS IN A PLASMA,
California Univ., Livermore. Lawrence Radiation Lab.
Stephen E. Bodner. 21 Feb 67, 17p
Contract W-7405-eng-48

Descriptors: (*Thermonuclear reactions, *Plasma medium), Interactions, Magnetic fields, Electrons, Charged particles, Electric currents.

For abstract, see NSA 21 15.
UCRL-50187 HC$3.00 MF$0.65

18B. Isotopes

PRECISE ATOMIC MASS DIFFERENCES INVOLVING ISOTOPES OF Nd, Sm, Cd, AND Pb,
Mcmaster Univ Hamilton (Ontario) Dept of Physics
John D. MacDougall, William McLatchie, Scott Whineray, and Henry E. Duckworth. 20 Sep 65, 8p
AFOSR-67-1745
Grant AF-AFOSR-159-64
Research supported in part by National Research Council of Canada.
Availability: Published in Zeitschrift fuer Naturforschung v21 n1/2 p63-8 1966.

Descriptors: (*Mass spectroscopy, Isotopes), (*Neodymium, Mass spectrum), (*Samarium, Mass spectrum), (*Cadmium, Mass spectrum), (*Lead, Mass spectrum), Spectrometers, Design, Performance (Engineering), Errors, Canada.

Certain experimental techniques were re-evaluated and modified. In the course of these investigations, redetermination was made of two atomic mass differences involving isotopes of cadmium and one involving isotopes of lead. The new values are consistent with reaction data and with older measurements. Thirteen mass differences involving isotopes of neodymium and samarium were also determined, several for the first time. These new results are consistent with reaction data and with other recent mass spectroscopic data, but indicate that our previously-reported mass differences in the neodymium-samarium region are systematically too large by small but real amounts. An unusually concordant situation now exists in this region of the mass table. (Author)
AD-655 951 Not available from CFSTI.

THE SHAPE OF THE MASS SURFACE IN THE REGION OF 90 NEUTRONS,
Mcmaster Univ Hamilton (Ontario) Dept of Physics
H. E. Duckworth, R. C. Barber, B. G. Hogg, J. D. MacDougall, and W. McLatchie. 1964, 5p
AFOSR-67-1757
Grant AF-AFOSR-159-64
Availability: Published in Congress International Nucl. Phys. Communicationa v2 p557-8 1964.

Descriptors: (*Isotopes, *Mass spectrum), Neutrons, Nuclei, Neodymium, Samarium, Nuclear energy levels, Canada.

A high resolution mass spectrometer was used to determine double-neutron separation energies for many of the stable nuclides with N between 84 and 98. These values, together with others that may be calculated from them by use of existing data, are listed and presented graphically. (Author)
AD-655 998 Not available from CFSTI.

GAMMA-RAY SPECTROMETRY OF NEUTRON-DEFICIENT ISOTOPES.
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 15.
IDO-17222 HC$3.00 MF$0.65

A FAMILY OF NEW ISOTOPIC WATER CURRENT METERS (THE DWICAS).
Johnston (William H.) Labs., Inc., Baltimore, Md.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 15.
JLI-2748-86 HC$3.00 MF$0.65

PEGRAM NUCLEAR PHYSICS LABORATORIES PROGRESS REPORT, JANUARY 1966-JANUARY 1967.
Columbia Univ., New York. Dept. of Physics.
1967, 211p
Contract AT-30-1-GEN-72

Descriptors: (*Nuclear physics laboratories, Reports), (*Neutron cross sections, Nuclear reac-

tions), Charged particles, Instrumentation, Interactions.

For abstract, see NSA 21 15.
NYO-GEN-132 HC$3.00 MF$0.65

FABRICATION OF SEMICONDUCTOR DEVICES BY NEUTRON TRANSMUTATION DOPING.
Fundamental Methods Associates, Inc., New York.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 15.
NYO-3124-2 HC$3.00 MF$0.65

RADIOISOTOPE SOURCE SAFETY TESTING,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 15.
ORNL-4092 HC$3.00 MF$0.65

THE EFFECT OF REPEATED TREATMENT WITH GAMMA RAYS ON THE RADIO-RESISTANLATED BACTERIA,
Massachusetts Inst. of Tech., Cambridge. Dept. of Nutrition and Food Science.
For primary bibliographic entry see Field 6H.
For abstract, see NSA 21 15.
TID-23707 HC$3.00 MF$0.65

18C. Nuclear Explosions

SMALL BOY PROJECT 62.80B AERORADIOACTIVITY SURVEY.
Edgerton, Germeshausen and Grier, Inc., Santa Barbara, Calif.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 15.
CEX-62.80B HC$3.00 MF$0.65

SEDAN PROJECT 62.80C, AERORADIOACTIVITY SURVEY.
Edgerton, Germeshausen and Grier, Inc., Santa Barbara, Calif.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 15.
CEX-62.80C HC$3.00 MF$0.65

DOSE-ESTIMATION STUDIES RELATED TO PROPOSED CONSTRUCTION OF AN ATLANTIC-PACIFIC INTEROCEANTIC CANAL WITH NUCLEAR EXPLOSIVES PHASE I,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 15.
ORNL-4101 HC$3.00 MF$0.65

GEOLOGIC AND ENGINEERING PROPERTIES INVESTIGATIONS.
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8G.
For abstract, see NSA 21 15.
PNE-720F HC$3.00 MF$0.65

18D. Nuclear Instrumentation

RADIOLOGICAL SAFETY INSTRUCTIONS FOR THE LANE-WELLS NUCLEAR SEDIMENT DENSITY METER.
Informal rept.,
Naval Oceanographic Office Washington D C
Newell T. Stiles, John R. Carpenter, and Robert A. Pedrick. Jul 67, 38p Rept no. NOO-IR-67-55

Descriptors: (*Radiation measurement systems, *Densimeters), Radioactive waste, Design, Radiation monitors, X rays, Radiological dosage, Sources, Measurement, Safety.

The report contains radiological safety instructions for the use of a 100 millicurie Cesium 137 source in the Lane-Wells Nuclear Sediment Density Meter. These instructions were prepared in compliance with the U. S. Atomic Energy Commission, Division of Materials Licensing regulations for radioactive byproduct materials. Procedures are provided for handling and storage of the source under shipboard operating conditions. Design drawings of the source and shield assemblies, and source handling tools; courtesy of Lane-Wells Company, Houston, Texas; are provided with radiation profiles of the source in the shielded and unshielded positions. Radiation dosage on the surface of the meter ranges from 50 to 146 milliroentgens per hour in the shielded position and 2600 milliroentgens per hour in the unshielded position. At a distance of four feet perpendicular to the meter, these values range from 0.5 milliroentgens per hour in the shielded position to 10 milliroentgens per hour in the unshielded position. (Author)
AD-656 083 HC$3.00 MF$0.65

A METHOD FOR THE ANALYSIS OF PULSE HEIGHT SPECTRA,
Aerospace Research Labs Wright-Patterson AFB Ohio
D. D. Watson, and H. D. Graber. 20 Feb 66, 10p Rept no. ARL-67-0085
Availability: Published in Nuclear Instruments and Methods v43 n2 p355-60 1966.

Descriptors: (*Gamma-ray spectroscopy, Computer programs), Gamma-ray spectra, Intensity, Analysis, Line spectrum, Background, Calibration.

An analytic method for computer analysis of gamma-ray pulse-height spectra is discussed and some results of the computer program are presented. The method allows the determination by the computer of the number and energies of the constituent gamma rays as well as their relative intensities. (Author)
AD-656 155 Not available from CFSTI.

OXYGEN-FREE ALUMINUM DOPED GERMANIUM FOR LITHIUM DRIFTING,
Simtec Ltd Montreal (Quebec)
C. Wilburn, and W. D. Edwards. 14 Dec 66, 2p
Prepared in cooperation with Defense Research Telecommunications Establishment, Ottawa (Ontario).
Availability: Published in Nuclear Instruments and Methods v48 p357-8 1967.

Descriptors: (*Semiconductor devices, *Nuclear radiation spectrometers), (*Germanium, *Crystal growt (, Doping, Lithium, Purification, Aluminum, Alumina, Gamma-ray spectroscopy, Instrumentation, Canada.

A description is given of a method of growing germanium crystals which are effectively oxygen-free and suitable for the fabrication of gamma ray spectrometers by the lithium drift process. Aluminum is used both as p-type dope and as a getter for oxygen. (Author)
AD-656 671 Not available from CFSTI.

RADIOLOGICAL PHYSICS DIVISION ANNUAL REPORT, JULY 1965 TO JUNE 1966,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 7E.
For abstract, see NSA 21 15.
ANL-7220 HC$3.00 MF$0.65

BROOKHAVEN NATIONAL LABORATORY ANNUAL REPORT JULY 1, 1966.
Associated Universities, Inc., New York.
For primary bibliographic entry see Field 18I.
BNL-994 (AS-20) HC$3.00 MF$0.65

MICROWAVE DETECTION OF MOISTURE IN REACTOR COOLANT GAS,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
D. P. Brown, and T. R. Billeter. May 67, 20p
Contract AT (45-1)-1830

Descriptors: (*Moisture, Detection), (*Reactor coolants, Gases), Microwaves, Gas-cooled reactors.

For abstract, see NSA 21 15.
BNWL-406 HC$3.00 MF$0.65

LUMINESCENCE DOSIMETRY,
Division of Technical Information Extension (Aec), Oak Ridge, Tenn.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 15.
CONF-650637 HC$3.00 MF$0.65

RELATIONSHIP OF EFFICIENCY TO PRESSURE DROP OF RESPIRATOR CARTRIDGES WITH INTRODUCED DEFECTS,
Hanford Occupational Health Foundation, Richland, Wash. Occupational Hygiene Dept.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 15.
HOHF-3 HC$3.00 MF$0.65

GAMMA-RAY SPECTROMETRY OF NEUTRON-DEFICIENT ISOTOPES.
Annual progress rept.,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
J. E. Cline, and R. L. Heath. May 67, 67p
Contract AT (10-1)-205

Descriptors: (*Nuclear radiation spectrometers, *Radioactive isotopes), Neutrons, Detectors, Radiation measurement systems, Pulse height analyzers.

For abstract, see NSA 21 15.
IDO-17222 HC$3.00 MF$0.65

A FAMILY OF NEW ISOTOPIC WATER CURRENT METERS (THE DWICAS).
Final rept.
Johnston (William H.) Labs., Inc., Baltimore, Md.
20 Jan 66, 288p
Contract AT (30-1)-2748

Descriptors: (*Structures, Underwater), (*Data transmission systems, *Electronics), Sensors, Calibration, Installation, Water, Power supplies, Meters.

For abstract, see NSA 21 15.
JLI-2748-86 HC$3.00 MF$0.65

FABRICATION OF SEMICONDUCTOR DEVICES BY NEUTRON TRANSMUTATION DOPING.
Annual rept.,
Fundamental Methods Associates, Inc., New York.
Carl N. Klahr, and Melvin S. Cohen. Jun 66, 84p
Contract AT (30-1)-3124

Descriptors: (*Semiconductor devices, Manufacturing methods), (*Neutrons, *Doping), Transistors, Diodes (Semiconductor), Germanium, Silicon.

For abstract, see NSA 21 15.
NYO-3124-2 HC$3.00 MF$0.65

INVESTIGATION OF SPONTANEOUS FLUCTUATIONS IN THE APPLICATION OFSEMICONDUCTOR DIODES AS DETECTORS OF NUCLEAR RADIATION.

Eidgenossische Technische Hochschule, Zurich (Switzerland).
L. Scott. 1966, 104p DISS-3845

Descriptors: *Nuclear radiation, *Radiation detector, *Semiconductor device, *Signal analysis, Analysis, Apparatus, Application, Circuit, Detector, Device, Diode, Effect, Energy, Error, Fluctuation, Interaction, Limitation, Measurement, Method, Noise, Nuclear, P-n junction, Particle, Radiation, Resolution, Semiconductor, Sensitivity, Signal, Solid, Source, Spontaneous, Statistical.

For abstract, see STAR 05 18.
N67-32469 HC$3.00 MF$0.65

HAZARDS CONTROL PROGRESS REPORT NO. 26, SEPTEMBER-DECEMBER 1966 AND INDEX TO HAZARDS CONTROL PROGRESS REPORTS NOS. 24 THROUGH 26.
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 15.
UCRL-50007-66-2 HC$3.00 MF$0.65

APPLICATIONS AND OPTIMIZATION OF THE LITHIUMDRIFTED GERMANIUM DETECTOR SYSTEM,
California Univ., Livermore. Lawrence Radiation Lab.
David C. Camp. 1 Mar 67, 102p

Descriptors: (*Germanium, Detectors), (*Lithium, *Optimization), Gamma rays, Semiconductors.

For abstract, see NSA 21 15.
UCRL-50156 HC$3.00 MF$0.65

IMPROVEMENTS IN THE SOLID-STATE PLUTONIUM-ALPHA AIR MONITOR,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 15.
UCRL-50228 HC$3.00 MF$0.65

BRIEF DESCRIPTION OF RESEARCH PUBLISHED OR ACCEPTED FOR PUBLICATION DURING 1966, .
Annual rept.,
Rochester Univ., N. Y. Atomic Energy Project.
William F. Neuman, and Aser Rothstein. 1 Apr 67, 253p
Contract W-7401-eng-49

Descriptors: (*Scientific research, Reports), (*Nuclear physics, Budgets), Nuclear engineering, Reactor materials.

For abstract, see NSA 21 15.
UR-49-748 HC$3.00 MF$0.65

18E. Nuclear Power Plants

AN AEROSPACE NUCLEAR SAFETY ANALYSIS OF A PM2 O3 RADIOISOJET THRUSTER.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A. J. Parker, Jr., D. W. Pyatt, and W. S. West. Jun 67, 41p NASA-TM-X-55844, X-701-67-279
Contract NAS5-10235
Prepared Jointly With Hittman Associates, Inc.

Descriptors: *Nuclear fuel, *Safety, *Thrustor, Abort, Aerodynamic, Analysis, Drag, Environment, Equation Fuel, Heating, Impact, Jet, Nuclear, Reentry, Surface.

For abstract, see STAR 05 18.
N67-32111 HC$3.00 MF$0.65

18F. Radiation Shielding and Protection

THE USE OF SCALE MODELS IN STRUCTURE SHIELDING EXPERIMENTS.
Final rept. 3 Jan-17 Dec 66,
Technical Operations Inc Burlington Mass
A. L. Kaplan, and N. B. Koepp-Baker. 21 Apr 67, 146p Rept no. TO-B-67-25
Contract N00228-66-C-0402

Descriptors: (*Shielding, Models (Simulations)), Scale, Structures, Dose rate, Radioactive fallout, Gamma rays, Steel.

Various aspects of using scale-model shielding data to predict the shielding effectiveness of full-scale structures were studied. Among the important problems considered were the estimate of the far-field contribution and the application of model data to the corresponding full-scale structure. The work has shown that for these two operations, separate treatment of the skyshine and non-skyshine components of the dose rates in the model structure produces good agreement with experimental and theoretical results for full-scale structures. This agreement is significantly better than that obtained by using the total dose rates to perform these operations, as was done in the earlier methods of han ing model data. In considering the materials used in model structures, it was found that the use of steel in model experiments on a psf basis to simulate concrete in the full-scale structure produces no difference in barrier reduction, within experimental accuracy, up to a barrier thickness of 150 psf. The results of the evaluation of the methods for designing and carrying of scale-model shielding studies and applying the results of these studies to full-scale structures indicate that scale-model experiments can be used to predict the shielding effectiveness of a corresponding full-scale structure to within plus or minus 10%. (Author)
AD-656 756 HC$3.00 MF$0.65

ISOSHLD-II CODE REVISION TO INCLUDE CALCULATION OF DOSE RATE FROM SHIELDED BREMSSTRAHLUNG SOURCES,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 7E.
For abstract, see NSA 21 15.
BNWL-236-Suppl-1 HC$3.00 MF$0.65

PROGRESS REPORT FOR SNAP GENERAL SUPPORTING TECHNOLOGY, NOVEMBER 1966-JANUARY 1967,
Atomics International, Canoga Park, Calif.
L. S. Mims. 5 May 67, 82p
Contract AT (04-3)-701

Descriptors: (*Auxiliary power plants, Reports), (*Nuclear power plants, *Nuclear engineering), Nuclear reactors.

For abstract, see NSA 21 15.
NAA-SR-12316 HC$3.00 MF$0.65

18G. Radioactive Wastes and Fission Products

RADIOACTIVE DISINTEGRATION AS A SUBSIDENCE PROCESS,
Naval Radiological DefenseLab San Francisco Calif
R. M. Langer. 17 Apr 67, 43p Rept no. USNRDL-TRC-67-25

Descriptors: (*Fission product activity, Integral transforms), (*Radioactive decay, Distribution functions), Radioactive isotopes, Mixtures, Statistical analysis, Nuclear spectroscopy.

The representation of fission product activity as the Laplace Transform of decay-constant distribution functions is studied and applied to idealized, empirical, and fractionated isotope distributions. It is also shown how the Inverse Transform may be used to draw conclusions about radioactive mixtures from measured decay curves. (Author)
AD-656 399 HC$3.00 MF$0.65

18H. Radioactivity

A TECHNICAL PAPER ON THE IRRADIATION INDUCED ELASTIC MEMORY OF POLYMERS.
Raychem Corp Redwood City Calif
For primary bibliographic entry see Field 11I.
AD-656 190 HC$3.00 MF$0.65

NUCLEAR RADIATION, A NEW ENVIRONMENT,
Battelle Memorial Inst Columbus Ohio
C. J. Lyons, and R. I. Leininger. Dec 58, 34p
Prepared for presentation at the Annual Symposium on Technical Progress in Communication Wires and Cables (7th), Asbury Park, N. J.

Descriptors: (*Nuclear radiation, *Radiation damage), Materials, Metals, Elastomers, Plastics, Polymers, Silicones, Electric wire, Electric cables, Alloys, Electrical properties, Hardness.

In recent years a new environment, nuclear radiation, has been added to the more familiar ones such as temperature, moisture, and ultraviolet. The importance of this new environment is increasing as atomic energy is harnessed for power production and the propulsion of ships and aircraft. The effects of the different types of radiation on materials of interest to the wire and cable industry are surveyed, and the magnitude of the problem presented by these radiations is estimated. (Author)
AD-656 278 HC$3.00 MF$0.65

RADIOACTIVE DISINTEGRATION AS A SUBSIDENCE PROCESS,
Naval Radiological Defense Lab San Francisco Calif
For primary bibliographic entry see Field 18G.
AD-656 399 HC$3.00 MF$0.65

RADIOACTIVE FALLOUT IN NORTHERN REGIONS.
Cold Regions Science and Engineering Part 1: Environment; Section A3: Climatology,
Cold Regions Research and Engineering Lab Hanover N H
C. Wilson. Feb 67, 44p Rept no. Science/Engineering-1-A3d

Descriptors: (*Radioactive fallout, *Northern Hemisphere), Arctic regions, Nuclear explosions, Radioactive isotopes, Stratosphere, Atmospheric precipitation, Detonations, Troposphere, Radioactivity, Climatology.

Information and data are given on the distribution of radioactive fallout and atmospheric processes, announced nuclear detonations, and monthly fallout deposition collection. It is pointed out that the 3 dangerous isotopes are Sr-90, Cs-137, and I-131. The data suggest that the Arctic and subarctic stratosphere plays an important role in the retention and release of radioactive fallout, so that, regardless of the latitude at which the debris is injected into the stratosphere, the fallout pattern may be unchanged. There is a close relationship between the tropospheric jet streams and associated cyclonic disturbances and the distribution of fallout at the earth's surface. This hypothesis calls for the transfer of the debris in well-defined layers

from the Arctic stratosphere deep down into the troposphere in the vicinity of the jet stream, where subsidence in the rear of cyclonic disturbances and the precipitation processes aid the rapid fall to earth. In the Northern regions, fallout behavior depends on the initial pattern of the westerly vortex at the time of the detonation and its subsequent development. (Author)
AD-656 448 HC$3.00 MF$0.65

THE EFFECT OF RADIATION ON POLYETHYLENE,
Bell Telephone Labs Inc Murray Hill N J
For primary bibliographic entry see Field 11I.
AD-656 513 HC$3.00 MF$0.65

MEDICAL SURVEY OF THE PEOPLE OF RONGELAP AND UTIRIK ISLANDS ELEVEN AND TWELVE YEARS AFTER EXPOSURE TO FALLOUT RADIATION (MARCH 1965 AND MARCH 1966),
Brookhaven National Lab., Upton, N. Y.
Wataru W. Sutow. Apr 67, 170p

Descriptors: (*Radioactive fallout, *Radiobiology), (*Radioactivity, Exposure), (*Medical research, Marshall Islands), Radiological dosage, Radioactive isotopes.

For abstract, see NSA 21 15.
BNL-50029 HC$3.00 MF$0.65

SMALL BOY PROJECT 62.80B AERORADIOACTIVITY SURVEY.
Edgerton, Germeshausen and Grier, Inc., Santa Barbara, Calif.
Nov 65, 19p EGG-1183-2060
Contract AT (29-1)-1183

Descriptors: (*Radioactivity, *Radiobiology), (*Aerial reconnaissance, *Radioactive fallout).

For abstract, see NSA 21 15.
CEX-62.80B HC$3.00 MF$0.65

SEDAN PROJECT 62.80C, AERORADIOACTIVITY SURVEY.
Edgerton, Germeshausen and Grier, Inc., Santa Barbara, Calif.
Nov 65, 16p EGG-1183-2062
Contract AT (29-1)-1183

Descriptors: (*Radioactivity, *Aerial reconnaissance), (*Radiobiology, *Radioactive fallout), Dose rate, Radiation measurement systems, Instrumentation.

For abstract, see NSA 21 15.
CEX-62.80C HC$3.00 MF$0.65

PEGRAM NUCLEAR PHYSICS LABORATORIES PROGRESS REPORT, JANUARY 1966-JANUARY 1967.
Columbia Univ., New York. Dept. of Physics.
For primary bibliographic entry see Field 18B.
For abstract, see NSA 21 15.
NYO-GEN-132 HC$3.00 MF$0.65

18I. Reactor Engineering and Operation

CHEMICAL ENGINEERING DIVISION SEMIANNUAL REPORT, JANUARY-JUNE 1966.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 15.
ANL-7225 HC$3.00 MF$0.65

AN EVALUATION OF THE APPLICABILITY OF EXISTING DATA TO THE ANALYTICAL DESCRIPTION OF A NUCLEAR-REACTOR ACCIDENT.
Quarterly progress rept. Jan-Mar 67,
Battelle Memorial Inst., Columbus, Ohio.
David L. Morrison, Samuel J. Basham, and Joachim N. Blutreich. 1 Apr 67, 56p
Contract W-7405-eng-92

Descriptors: (*Reactor accidents, Nuclear reactors), (*Reactor operation, Nuclear power plants), Reactor hazards.

For abstract, see NSA 21 15.
BMI-1797 HC$3.00 MF$0.65

BROOKHAVEN NATIONAL LABORATORY ANNUAL REPORT JULY 1, 1966.
Associated Universities, Inc., New York.
1 Jul 66, 249p
Contract AT-30-2-GEN-16

Descriptors: (*Nuclear engineering, Mathematics), (*Nuclear physics, Chemistry), Biology, Medical research, Particle accelerators, Instrumentation, Reports, Professional personnel, Management engineering.

Five main headings are: (1) Fundamental studies of atomic nuclei, the particles that constitute them, and the forces involved in their structure. (2) Studies of the physical, chemical, and biological effects of nuclear radiation. (3) The use of nuclear tools, such as neutrons, charged particles, gamma rays, and isotopic tracers, in all branches of scientific research. (4) Research and development, not necessarily itself of a nuclear nature, directed toward solving the problems of atomic energy development. (5) The development of specific devices for use as research tools or in practical applications of atomic energy.
BNL-994 (AS-20) HC$3.00 MF$0.65

CROSS-FLOW MIXING BETWEEN PARALLEL FLOW CHANNELS DURING BOILING. PART I. COBRA COMPUTER PROGRAM FOR COOLANT BOILING IN ROD ARRAYS,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
D. S. Rowe. Mar 67, 112p
Contract AT (45-1)-1830

Descriptors: (*Reactor coolants, Boiling), (*Reactor fuel rods, Computer programs), Fluid flow, Reactor materials, Nuclear engineering, Nuclear reactors.

For abstract, see NSA 21 15.
BNWL-371 PT. I HC$3.00 MF$0.65

MICROWAVE DETECTION OF MOISTURE IN REACTOR COOLANT GAS,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 15.
BNWL-406 HC$3.00 MF$0.65

THE 1107 MANUAL FOR PHYSICS CHAIN, A REACTOR ANALYSIS CODE,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
E. L. Kelley, Jr., and D. R. Marr. Apr 67, 72p
Contract AT (45-1)-1830

Descriptors: (*Nuclear power plants, *Programming (Computers)), (*Nuclear reactors, *Nuclear engineering), Physics, Coding, Instruction manuals.

For abstract, see NSA 21 15.
BNWL-413 HC$3.00 MF$0.65

THE EFFECTS OF COOLANT TEMPERATURE AND INITIAL POWER LEVEL ON THE EXCURSION BEHAVIOR OF A HIGHLY ENRICHED PLATE CORE IN SPERT III EXPERIMENT AND ANALYSIS,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
For primary bibliographic entry see Field 9B.
For abstract, see NSA 21 15.
IDO-17138 HC$3.00 MF$0.65

EQUILIBRIUM TIME FOR A SQUARE PLANT VARIABLE RESERVOIR INITIAL CONCENTRATIONS,
Oak Ridge Gaseous Diffusion Plant, Tenn.
D. W. Burton. 4 Apr 67, 12p
Contract W-7405-eng-26

Descriptors: (*Nuclear engineering, *Reactor system components), (*Reactor start-up sources, Cascade structures).

For abstract, see NSA 21 15.
K-1330 HC$3.00 MF$0.65

PIQUA NUCLEAR POWER FACILITY REACTOR OPERATIONS ANALYSIS PROGRAM.
Semiannual progress rept. no. 8 1 Jan-30 Jun 66.
Atomics International, Canoga Park, Calif.
31 Dec 66, 219p
Contract AT (11-1)-GEN-8

Descriptors: (*Reactor operation, Nuclear power plants), (*Reactor cores, *Reactor fuel rods), Reactor fuel elements, Reactor control, Nuclear radiation, Recovery, Reactor coolants, Embrittlement, Hydraulic systems, Reactor shutdown, Instrumentation, Performance (Engineering), Temperature coefficient of reactivity.

Contents: Review of operating characteristics; PNPF modifications; Recovery program, special studies; PNPF coolant chemistry and analysis, semiannual report.
NAA-SR-12148 HC$3.00 MF$0.65

PROGRESS REPORT FOR SNAP GENERAL SUPPORTING TECHNOLOGY, NOVEMBER 1966-JANUARY 1967,
Atomics International, Canoga Park, Calif.
For primary bibliographic entry see Field 18F.
For abstract, see NSA 21 15.
NAA-SR-12316 HC$3.00 MF$0.65

DESIGN, PERFORMANCE, AND ECONOMICS EVALUATION OF SODIUM-HEATED, MODULAR, SUPERCRITICAL, STEAM GENERATORS,
Atomics International, Canoga Park, Calif.
D. F. Casey. 31 Oct 66, 71p
Contract AT (11-1)-GEN-8

Descriptors: (*Steam, *Generators), Performance (Engineering), Sodium, Heating, Design, Economics.

For abstract, see NSA 21 15.
NAA-SR-8508 HC$3.00 MF$0.65

ABSTRACTS OF PAPERS, WATER AND DESALINATION INFORMATION MEETING, MARCH 28-29, 1967.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 7A.
For abstract, see NSA 21 15.
ORNL-4115 HC$3.00 MF$0.65

THE LIVERMORE POOL TYPE REACTOR (LPTR),
California Univ., Livermore. Lawrence Radiation Lab.
John B. Radcliffe, Jr., Ernest E. Hill, and Garth

E. Cummings. Jan 67, 54p
Contract W-7405-eng-48

Descriptors: (*Reactor control, Nuclear reactors), (*Nuclear power plants, *Reactor operation), Reactor fuel elements, Costs, Dose rate, Reactor hazards, Shielding, Coolants.

For abstract, see NSA 21 15.
UCRL-4919 Rev. II HC$3.00 MF$0.65

BRIEF DESCRIPTION OF RESEARCH PUBLISHED OR ACCEPTED FOR PUBLICATION DURING 1966,.
Rochester Univ., N. Y. Atomic Energy Project.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 15.
UR-49-748 HC$3.00 MF$0.65

PRESSURIZED WATER REACTOR (PWR) PROJECT. TECHNICAL PROGRESS REPORT FOR THE PERIOD JANUARY 21, 1967 TO APRIL 21, 1967.
Bettis Atomic Power Lab., Pittsburgh, Pa.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 15.
WAPD-MRP-120 HC$3.00 MF$0.65

18J. Reaçtor Materials

CONTACT DIFFUSION INTERACTION OF MATERIALS WITH CLADDING,
Redstone Scientific Information Center Redstone Arsenal Ala Translation Branch
A. A. Babad-Zakhryapina. 19 May 67, 40p
RSIC-676, TT-67-62505
Trans. of Symposium on Thermodynamics with Emphasis on Nuclear Materials and Atomic Transport in Solids, Vienna, 22-27 Jul 65. Proceedings Series 2. n.p., 1966 p153-80.

Descriptors: (*Reactor fuel cladding, Diffusion), Reactor fuels, Carbides, Interactions, Uranium compounds, Molybdenum, Tungsten, Zirconium, Zirconium compounds, USSR.
Identifiers: Uranium carbides, Zirconium carbide.

Consideration is given to problems arising from diffusion interaction between materials and their claddings and the film of condensate formed on their surfaces. Topics include: characteristics of diffusion in condensates formed on a hot cladding; diffusion of carbon from uranium carbide into molybdenum and tungsten; diffusion of carbon into zirconium and zirconium carbide.
AD-656 446 HC$3.00 MF$0.65

IRRADIATION EFFECTS ON REACTOR STRUCTURAL MATERIALS.
Quarterly progress rept. 1 Feb-30 Apr 67,
Naval Research Lab Washington D C
J. R. Hawthorne, C. Z. Serpan, Jr., H. E. Watson, and R. A. Gray, Jr. 15 May 67, 62p Rept no. NRL-MR-1780
See also AD-650 349.

Descriptors: (*Reactor materials, *Radiation damage), (*Steel, Radiation damage), Neutron reactions, Metal plates, Ductility, Maraging steels, Embrittlement, Notch sensitivity, Welds, Annealing, Pressure vessels, Milling machines, Automatic, Test equipment, Remote control systems, Power reactors, Pressurized water reactors, Heavy water reactors.
Identifiers: Army reactors (MH-1), Army reactors (SM-1), Carolinas-Virginia Tube Reactor, Steel A302-B, Steel A350-LF1.

The report includes the following: (1) a comparison of the response of selected structural steels to irradiation at 550 and 650F to high neutron fluences, (2) the through-thickness Charpy-V notch ductility performance of a 10-1/2-in.-thick plate of irradiated A302-B steel, (3) an investigation of the effects of oxygen and nitrogen contents on the radiation embrittlement sensitivity of 7-1/2Ni-Cr-Mo steel at 250F, (4) the notch ductility behavior of irradiated 12Ni-5Cr-3Mo maraging steel weldments, (5) the response of A350-LF1 (Modified) steel to postirradiation annealing at temperatures in the range of 550 to 590F, (6) the notch ductility behavior of A350-LF1 (Modified) steel with cyclic 430F irradiation-168 hour annealing, (7) the preirradiation mechanical properties of the MH-1A reactor pressure vessel steel, (8) the notch ductility of several reactor structural steels after irradiation in a heavy water moderated reactor, (9) the modification, installation, and initial operation of a remotely operated, tape-controlled milling machine, and (10) a description of newly acquired remotely operated precision measuring equipment. (Author)
AD-656 578 HC$3.00 MF$0.65

METALLURGICAL FAILURE ANALYSIS OF PM-3A REACTOR CONTROL ROD LIFTING KNOB.
Memorandum rept.,
Naval Research Lab Washington D C
J. R. Hawthorne, C. Z. Serpan, Jr., R. A. Gray, Jr., H. E. Watson, and O. R. Mylting. 14 Jun 67, 27p Rept no. NRL-MR-1788

Descriptors: (*Failure (Mechanics), *Control rods), (*Fittings, *Control rods), Nuclear reactors, X-ray spectroscopy, Stainless steel, Gravimetric analysis, Microstructure, Hardness, Radiation damage, Specifications, Metallurgy, Tables.

A metallurgical analysis has been performed upon a failed control rod cap from the Navy PM-3A Nuclear Power Plant. Material supplied to the Metallurgy Division for this investigation was the lifting knob which had separated in service from the main body of the cap. The specific objective of the analysis was to determine if the material of application met design specifications and to determine the probable cause of component failure. Compositional analysis by x-ray spectrochemical and gravimetric techniques established that the lifting knob, and thus the failed control rod cap, was fabricated from a 300 series stainless steel, not from 17-4 PH precipitation hardening stainless steel as specified. Microstructural and hardness examinations further confirmed the substitution of a 300 series stainless steel for the 17-4 PH steel composition. Examination of the stem of the control rod cap knob at which failure occurred revealed severe 'necking down' and heavy striations corresponding to work hardening lines. This visual evidence coupled with analytical evidence of a low strength material of application suggests component failure through gross overload. (Author)
AD-656 579 HC$3.00 MF$0.65

CHEMICAL ENGINEERING DIVISION SEMI-ANNUAL REPORT, JANUARY-JUNE 1966.
Argonne National Lab., Ill.
Nov 66, 235p
Contract W-31-109-eng-38

Descriptors: (*Chemical engineering, *Fluidized bed processes), (*Physical chemistry, *Calorimetry), Reactor materials.

For abstract, see NSA 21 15.
ANL-7225 HC$3.00 MF$0.65

LABORATORY INVESTIGATIONS IN SUPPORT OF FLUID-BED FLUORIDE VOLATILITY PROCESSES. PART XIV. THE CORROSION OF NICKEL AND NICKEL ALLOYS BY FLUORINE, URANIUM HEXAFLUORIDE, AND SELECTED VOLATTLE FISSION PRODUCT FLUORIDES AT 500 DEGREES C,
Argonne National Lab., Ill.
William H. Gunther, and Martin J. Steindler. Dec 66, 40p
Contract W-31-109-eng-38

Descriptors: (*Fluidized bed processes, *Fluorides), Nickel, Nickel alloys, Corrosion, Fission products, Fluorine, Uranium compounds, Nuclear physics laboratories.

For abstract, see NSA 21 15.
ANL-7241 HC$3.00 MF$0.65

TWO AXISYMMETRIC STEADY-STATE THERMOELASTICITY PROBLEMS FOR TRANSVERSELY ISOTROPIC SOLIDS,
Argonne National Lab., Ill.
Richard A. Valentin. Dec 66, 35p
Contract W-31-109-eng-38

Descriptors: (*Thermodynamics, *Axially symmetric flow), (*Elasticity, Deformation), Reactor fuel elements.

For abstract, see NSA 21 15.
ANL-7277 HC$3.00 MF$0.65

PREPARATION OF URANIUM MONOCARBIDE BY REACTION IN A LIQUID-METAL MEDIUM,
Argonne National Lab., Ill.
E. J. Petkus, T. R. Johnson, and R. K. Steunenberg. Mar 67, 33p
Contract W-31-109-eng-38

Descriptors: (*Uranium compounds, *Carbides), (*Liquid metals, Nuclear reactions), Chemical engineering, Reactor materials.

For abstract, see NSA 21 15.
ANL-7301 HC$3.00 MF$0.65

GEL-ADDITION PROCESS CHEMICAL STUDIES. QUARTERLY PROGRESS REPORT NO. 2, OCTOBER-DECEMBER 1966.
Quarterly progress rept. no. 2, Oct-Dec 66,
Babcock and Wilcox Co., Lynchburg, Va. Atomic Energy Div.
E. H. Dewell. May 67, 40p
Contract AT (30-1)-3714

Descriptors: (*Gels, Preparation), (*Uranium compounds, *Plutonium compounds), Oxides, Reduction.

For abstract, see NSA 21 15.
BAW-3714-2 HC$3.00 MF$0.65

AN EVALUATION OF THE APPLICABILITY OF EXISTING DATA TO THE ANALYTICAL DESCRIPTION OF A NUCLEAR-REACTOR ACCIDENT.
Battelle Memorial Inst., Columbus, Ohio.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 15.
BMI-1797 HC$3.00 MF$0.65

AN EVALUATION OF UC-PUC FOR SODIUM-COOLED FAST REACTORS,
Battelle Memorial Inst., Columbus, Ohio.
Richard A. Wullaert, Joseph M. Fackelmann, and WalstonChubb. 13 Apr 67, 30p
Contract W-7405-eng-92

Descriptors: (*Uranium compounds, *Plutonium compounds), (*Fast reactors, *Reactor coolants), Sodium.

For abstract, see NSA 21 15.
BMI-1799 HC$3.00 MF$0.65

COMPATIBILITY OF PYROLYTIC-CARBON COATED FUEL PARTICLES WITH WATER VAPOR,
Oak Ridge National Lab., Tenn.
C. M. Blood, and L. G. Overholser. Nov 66, 30p
Contract W-7405-eng-26

Descriptors: (*Reactor fuels, Particles), (*Water vapor, Coatings), Carbon, Pyrolysis, Oxidation.

For abstract, see NSA 21 15.
ORNL-4014 HC$3.00 MF$0.65

DETERMINATION OF THE FRACTURE TOUGHNESS OF EGCR-TYPE AGOT GRAPHITE,
Oak Ridge National Lab., Tenn.
J. M. Corum. Dec 66, 45p
Contract W-7405-eng-26

Descriptors: (*Graphite, Toughness), (*Fracture (Mechanics), Reactor materials), Nuclear engineering.

For abstract, see NSA 21 15.
ORNL-4030 HC$3.00 MF$0.65

THE LIVERMORE POOL TYPE REACTOR (LPTR),
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 15.
UCRL-4919 Rev. II HC$3.00 MF$0.65

BRIEF DESCRIPTION OF RESEARCH PUBLISHED OR ACCEPTED FOR PUBLICATION DURING 1966,.
Rochester Univ., N. Y. Atomic Energy Project.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 15.
UR-49-748 HC$3.00 MF$0.65

PRESSURIZED WATER REACTOR (PWR) PROJECT. TECHNICAL PROGRESS REPORT FOR THE PERIOD JANUARY 21, 1967 TO APRIL 21, 1967.
Bettis Atomic Power Lab., Pittsburgh, Pa.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 15.
WAPD-MRP-120 HC$3.00 MF$0.65

18K. Reactor Physics

DTF-BURN A MULTIGROUP TRANSPORT THEORY BURNUP PROGRAM WRITTEN IN FORTRAN-IV,
Los Alamos Scientific Lab., N. Mex.
Joseph J. Prabulos, Jr. 20 Jan 67, 93p
Contract W-7405-eng-36

Descriptors: (*Programming languages, *Neutron transport theory), Coding, Programming (Computers), Fuel burn up.

For abstract, see NSA 21 15.
LA-3671 HC$3.00 MF$0.65

PROGRESS REPORT FOR SNAP GENERAL SUPPORTING TECHNOLOGY, NOVEMBER 1966-JANUARY 1967,
Atomics International, Canoga Park, Calif.
For primary bibliographic entry see Field 18F.
For abstract, see NSA 21 15.
NAA-SR-12316 HC$3.00 MF$0.65

CALCULATION OF FAST-NEUTRON FLUX EMERGING FROM A REACTOR BEAMHOLE AND COMPARISON WITH EXPERIMENT.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
H. S. Bloomfield. Aug 67, 18p NASA-TM-X-1418
Contract 120-27-06-07-22

Descriptors: *Fast neutron, *Neutron flux, *Plum brook reactor, Calculation, Comparison, Cross section, Dose, Fast, Flux, Measurement, Neutron, Rate, Reactor.

For abstract, see STAR 05 18.
N67-32335 HC$3.00 MF$0.65

THE NPY INTERNATIONAL ADVANCED SUMMER SCHOOL ON REACTOR PHYSICS (2d), NORWAY, AUGUST, 1966.
Kjeller Research Establishment (Norway). Institut for Atomenergi.
Aug 66, 270p KR-117
Sponsored by the International Atomic Energy Agency through the NPY Project and arranged in cooperation with the Netherlands'-Norwegian Reactor School.

Descriptors: (*Reactor operation, Symposia), (*Critical assemblies, Physics), Buckling (Neutron density), Reactor lattice parameters, Neutron transport theory, Reactor cores, Neutron flux, Heterogeneous reactors, Test methods, Neutron spectrum, Reactor reactivity, Decay schemes, Reactor kinetics, Norway.

The document is comprised of a series of lectures presented at a school conducted under the joint auspices of the International Atomic Energy Agency and the Governments of Norway, Poland, and Yugoslavia. The lectures are: The buckling concept in reactor theory and experiment, by H. Kouts; Evaluation of buckling and other parameters from two- or multiregion experiments, by R. Persson; The analysis of critical and subcritical experiments, a Comparison, by I. Kaplan; Interpretation of critical experiments with heterogeneous reactor theory, by S. M. Feinberg; Review of experimental techniques for the determination of cell parameters, by I. Kaplan; Analysis and utilization of cell parameter measurements, by M. N. Nikolaev; Experimental and theoretical determination of thermal and epithermal neutron spectral indices, by P. F. Zweifel; Definition and utilization of the concept of reactivity, by E. P. Gyftopoulos; Analysis and utilization of kinetic experiments for determining reactivity, by W. Matthes; The interdependence of experiments and theory in reactor physics, with special reference to current outstanding problems, by S. M. Feinberg.
PB-175 681 HC$3.00 MF$0.65

A CALCULATION OF THE AGE AND FAST EFFECT FOR MONOENERGETIC NEUTRONS IN BE AND BEO,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 20H.
For abstract, see NSA 21 15.
UCRL-50229 HC$3.00 MF$0.65

18L. Reactors (Power)

AN EVALUATION OF THE APPLICABILITY OF EXISTING DATA TO THE ANALYTICAL DESCRIPTION OF A NUCLEAR-REACTOR ACCIDENT.
Battelle Memorial Inst., Columbus, Ohio.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 15.
BMI-1797 HC$3.00 MF$0.65

ABSTRACTS OF PAPERS, WATER AND DESALINATION INFORMATION MEETING, MARCH 28-29, 1967.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 7A.
For abstract, see NSA 21 15.
ORNL-4115 HC$3.00 MF$0.65

PRESSURIZED WATER REACTOR (PWR) PROJECT. TECHNICAL PROGRESS REPORT FOR THE PERIOD JANUARY 21, 1967 TO APRIL 21, 1967.
Bettis Atomic Power Lab., Pittsburgh, Pa.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 15.
WAPD-MRP-120 HC$3.00 MF$0.65

18M. Reactors (Non-Power)

THE EFFECTS OF RADIATION ON SILICONE RUBBER WIRE AND CABLE INSULATION,
Dow Corning Corp Midland Mich Product Engineering Labs
For primary bibliographic entry see Field 9A.
AD-656 276 HC$3.00 MF$0.65

THE LIVERMORE POOL TYPE REACTOR (LPTR),
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 15.
UCRL-4919 Rev. II HC$3.00 MF$0.65

18N. SNAP Technology

ISOSHLD-II CODE REVISION TO INCLUDE CALCULATION OF DOSE RATE FROM SHIELDED BREMSSTRAHLUNG SOURCES,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 7E.
For abstract, see NSA 21 15.
BNWL-236-Suppl-1 HC$3.00 MF$0.65

DESIGN AND PERFORMANCE OF A NUCLEAR REACTOR SIMULATOR FOR NONNUCLEAR TESTING OF SPACE POWER SYSTEMS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
K. S. Jeff. Aug 67, 35p NASA-TN-D-4095
Contract 701-04-00-02-22

Descriptors: *Electric power conversion, *Nuclear power conversion, *Power supply, *Simulator, *Snap- 8, Analog, Computer, Conversion, Design, Electric, Heater, Nuclear, Performance, Power, Supply, Testing.

For abstract, see STAR 05 18.
N67-32371 HC$3.00 MF$0.65

RADIOLOGICAL SAFETY STUDIES OF SPACE NUCLEAR SYSTEMS.
Nus Corp., Washington, D. C.
For primary bibliographic entry see Field 22-.
For abstract, see NSA 21 15.
SC-CR-66-2144 HC$3.00 MF$0.65

19. ORDNANCE

19A. Ammunition, Explosives, and Pyrotechnics

PROCESS CONTROL METHODS FOR DETERMINING SMALL AMOUNTS OF MOISTURE IN PYROTECHNICS. I. ELECTROLYTIC HYGROMETER.
Technical rept.,
Picatinny Arsenal, Dover, N. J. Ammunition Engineering Directorate.
Milton Roth. Apr 65, 36p
PA-TR-3239-Pt-1

Descriptors: (*Pyrotechnics, Moisture), (*Moisture, Pyrotechnics), (*Hygrometers, Pyrotechnics), Explosive materials, Propellants, Instrumen-

tation, Chemical analysis, Electrolysis, Water, Sensitivity, Microwave equipment, Radiofrequency, Attenuation, Operation.

A project designed to develop process control methods for determining the moisture content of pyrotechnics is in progress. The first stage of this project involved a survey of commercially available instruments. This report describes the results of the survey and gives a detailed evaluation of the electrolytic hygrometer (EH), the instrument considered most promising. Limited data obtained with other instruments is presented but further work is planned since they appear to offer advantages not attainable by the EH. (Author)
AD-463 061 HC$3.00 MF$0.65

RESEARCH DIRECTED TOWARD REFINEMENT OF GEODETIC TECHNIQUES UTILIZING TERRESTRIAL AND SPATIAL CONFIGURATIONS.
Georgetown Coll Washington D C Observatory
For primary bibliographic entry see Field 3A.
AD-655 933 HC$3.00 MF$0.65

SUBMARINE CABLE ACTIVITIES,
Navy Electronics Lab San Diego Calif
For primary bibliographic entry see Field 13J.
AD-656 507 HC$3.00 MF$0.65

THERMAL STABILITIES OF HEXANITROAZOBENZENE (HNAB) AND HEXANITROBIPHENYL (HMB),
Naval Ordnance Lab White Oak Md
John C. Hoffsommer, and Jeffery S. Feiffer. 23 Jun 67, 25p Rept no. NOLTR-67-74

Descriptors: (*Explosive materials, Thermal stability), (*Organic nitrogen compounds, Thermal stability), Pyrolysis, Reaction kinetics, Nitrobenzenes, Free radicals, Chromatographic analysis.

Rates of thermal decompositions for 2,2',4,4',6,6'-hexanitroazobenzene (HNAB) and 2,2',4,4',6,6'-hexanitrobiphenyl (HNB) were measured in the temperature range 215C to 280C by analysis for undecomposed explosive. HNAB decomposed 1.3% hour at 230C, about 18 times faster than HNB. At 280C HNAB decomposed 60%/hour, 4 times faster than HNB. Supercooled liquids of both HNAB and HNB decomposed faster than the solids measured at the same temperature; however, the relative increase in liquid decomposition was much greater for HNB. Isolation and identification of several products from these decompositions indicate the presence of free radicals. Evidence for the formation of picryl radicals during HNAB decomposition is presented. (Author)
AD-656 572 HC$3.00 MF$0.65

MATHEMATICAL AND EXPERIMENTAL INVESTIGATION OF THERMAL INITIATION OF EXPLOSION.
Lehigh Univ Bethlehem Pa Inst of Research
For primary bibliographic entry see Field 19D.
AD-656 757 HC$3.00 MF$0.65

19B. Bombs

SOME EFFECTS OF AIRCRAFT GEOMETRY ON THE INCREMENTAL DRAG CHARACTERISTICS OF MARK 82 BOMBS,
David Taylor Model Basin Washington D C Aerodynamics Lab
David W. Lacey, and Peter T. Eaton. Mar 67, 23p Rept no. Test-AL-33

Descriptors: (*Bombs, Drag), (*External stores, Configuration), Wing-body configurations, Aircraft, Attack bombers, Mach number, Angle of attack.
Identifiers: Mark-82 bombs, A-4 aircraft.

An experimental study was conducted to investigate the incremental drag of a typical parabolic-type external store when mounted on two different aircraft shapes. This was accomplished by determining the drag characteristics of as many as four Mk 82 bombs when externally installed on both a generalized wing-body aircraft configuration and the A-4 aircraft. Test conditions included Mach numbers between 0.80 and 0.95 and angles of attack up to 6 degrees. The incremental drag per installed bomb was found to be essentially the same as the drag of the isolated bomb at a Mach number of 0.80, regardless of the aircraft used. At Mach numbers of 0.90 and above, however, the incremental drag per bomb is as much as eight times the drag of the isolated bomb and is consistently greater when the bombs are installed on the A-4 than when they are installed on the generalized wing-body configuration. (Author)
AD-656 059 HC$3.00 MF$0.65

19D. Explosions, Ballistics, and Armor

ORDNANCE ENGINEERING DESIGN HANDBOOK: SERVOMECHANISMS. SECTION 1: THEORY, CONSISTING OF CHAPTERS 1-10.
Pamphlet.
Office of the Chief of Ordnance Washington D C Aug 59, 232p Rept no. ORDP-20-136
See also AD-655 862 and AD-655 863.

Descriptors: (*Ordnance, Handbooks), (*Servomechanisms, Theory), Control systems, Feedback, Performance (Engineering), Nonlinear systems, Gain, Bandwidth, Stochastic processes, Transients, Response, Design, Amplifiers, Optimization, Errors, Data.

Contents: Properties of feedback control systems; Dynamic response; Methods of determining dynamic response of linear systems; Stability of feedback control systems; Gain determination; Compensation techniques; Performance evaluation; Optimization methods for transient and stochastic inputs; Sample-data systems; Nonlinear systems. (Author)
AD-655 861 HC$3.00 MF$0.65

ORDNANCE ENGINEERING DESIGN HANDBOOK: SERVOMECHANISMS. SECTION 2: MEASUREMENT AND SIGNAL CONVERTERS, CONSISTING OF CHAPTERS 11-12.
Pamphlet.
Office of the Chief of Ordnance Washington D C Aug 59, 130p Rept no. ORDP-20-137
See also AD-655 861 and AD-655 863.

Descriptors: (*Ordnance, Handbooks), (*Servomechanisms, *Design), Signals, Measurement, Classification, Potentiometers, Transformers, Synchros, Inductance, Tachometers, Gyroscopes, Programming (Computers), Modulators, Digital computers, Sensitivity, Demodulators, Theory, Performance (Engineering).

Contents: Potentiometers; Rotary transformers; General classifications; Synchros; Induction resolvers; Induction potentiometers; Toroid-wound rotary transformers; Microsyns; Linear variable differential transformers; Tachometer generators; Drag-cup a-c tachometer generator; Gyroscopes; Analog-to-digital converters; Voltage-to-digital coders; Modulators; Electronic demodulators; Digital-to-analog conversion. (Author)
AD-655 862 HC$3.00 MF$0.65

ORDNANCE ENGINEERING DESIGN HANDBOOK: SERVOMECHANISMS. SECTION 3: AMPLIFICATION, CONSISTING OF CHAPTER 13.
Pamphlet.
Office of the Chief of Ordnance Washington D C Aug 59, 125p Rept no. ORDP-20-138
See also AD-655 861, AD-655 862.

Descriptors: (*Ordnance, Handbooks), (*Servomechanisms, Design), Magnetic amplifiers, Diodes, Transistor amplifiers, Feedback amplifiers, Circuits, Direct current, Relays, Power amplifiers, Electric bridges, Specifications, Mechanical properties, Performance (Engineering), Thyratrons, Pneumatic servomechanisms.

Contents: Electronic amplifiers; Vacuum tubes; Linear analysis of single-stage vacuum-tube voltage amplifiers; Power amplifiers; Cascading amplifier stages; Feedback amplifiers; Problems encountered in use of electronic amplifiers as servo components; Thyratron amplifiers; D-C power supplies for electronic amplifiers; Transistor amplifiers; Basic theory of junction diodes and transistors; Analysis of transistor characteristics; Transistor amplifier circuits; A-C power amplifier design; Magnetic amplifiers; Typical circuits; Analytical representation of magnetic amplifiers; Performance of magnetic amplifiers; Construction of magnetic amplifiers; Specifications and design; Rotary electric amplifiers; Types of rotary electric amplifiers; Typical characteristics and design data of some rotary electric amplifiers; Relay amplifiers; Reversible motor-shaft rotation; Polarized relays; Hydraulic amplifiers; Translational hydraulic amplifiers; Rotary hydraulic amplifiers; Hydraulic-circuit elements; Pneumatic amplifiers; Mechanical amplifiers. (Author)
AD-655 863 HC$3.00 MF$0.65

INVESTIGATION OF SENSITIVITY OF FERTILIZER GRADE AMMONIUM NITRATE TO EXPLOSION.
Technical rept.,
Picatinny Arsenal Dover N J
P. F. Macy, T. D. Dudderar, E. F. Reese, and L. H. Eriksen. 11 Jul 47, 48p Rept no. PA-TR-1658

Descriptors: (*Fertilizers, *Explosions), (*Ammonium compounds, Explosions), (*Nitrates, Explosions), Disasters, Explosive materials, Ignition, Detonations, Sensitivity, Explosive gases.
Identifiers: Ammonium nitrate.

In order to determine the probable cause and mechanism of the explosion of cargoes of fertilizer grade ammonium nitrate on shipboard at Texas City, Texas, on 16 and 17 April 1947, an investigation was made of the materials involved, possible contaminants, and the possibility of converting combustion of the bagged nitrate into a detonation. It was found that the combustion of nitrate and paper or wood can produce gaseous products which can undergo explosion and in turn initiate the explosion of unconsumed nitrate fertilizer. A hypothesis of the mechanism of the Texas City disaster was established on this basis. (Author)
AD-655 888 HC$3.00 MF$0.65

ORDNANCE ENGINEERING DESIGN HANDBOOK: SERVOMECHANISMS. SECTION 4: POWER ELEMENTS AND SYSTEM DESIGN, CONSISTING OF CHAPTERS 14-20.
Pamphlet.
Office of the Chief of Ordnance Washington D C Aug 59, 199p Rept no. ORDP-20-139
See also AD-655 863, AD-655 862, AD-655 861.

Descriptors: (*Ordnance, Handbooks), (*Servomechanisms, Design), Hydraulic servomechanisms, Pneumatic servomechanisms, Gears, Mechanical properties, Roller bearings, Specifications, Friction, Valves, Graphics, Thermal properties, Hydraulic accumulators, Viscosity, Helical springs, Stresses, Tables.

Contents: Direct-current motors; Dynamic characteristics of d-c motors; Measurement of d-c motor parameters; Types of a-c motors used in

servomechanisms; Static characteristics of a-c motors; Dynamic behavior of 2-phase servomotors; Hydraulic motors; Pneumatic motors; Gear trains; Mechanical differentials; Linkages and levers; Sheaves and tapes; Mechanical coupling devices; Bearings; Gathering of specifications; Design of the servo; Representative designs; Auxiliaries associated with servomechanisms; Constructional techniques; Supplementary tables, formulas, and charts. (Author)
AD-655 899 HC$3.00 MF$0.65

PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON DETONATION (4th), HELD OCTOBER 12-15, 1965 NAVAL ORDNANCE LABORATORY, WHITE OAK, MARYLAND.
Office of Naval Research Washington D C
Sep 66, 656p Rept no. ONR-ACR-126
Sponsored by Naval Ordnance Lab., White Oak, Md.
Availability: Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402 $5.00.

Descriptors: (*Detonations, Symposia), Explosions, Explosive materials, Shock waves, Fluid mechanics, Explosives initiators, Ignition, Chemical reactions, Hydrodynamics, Numerical analysis, Test methods, Experimental design.

The document is comprised of the approximately 80 papers presented at the symposium. The topics covered include: detonation in condensed phases; shock waves and related flows; initiation, ignition, and growth of reaction; hydrodynamic computation methods; experimental methods.
AD-656 036 MF$0.65

AVERAGED EQUATIONS FOR THE SLOW OSCILLATORY MOTION OF A SPINNING SHELL.
Research rept.,
Naval Ordnance Test Station China Lake Calif
W. R. Haseltine. Jun 67, 47p Rept no. NOTS-TP-4355

Descriptors: (*Spin-stabilized ammunition, Equations of motion), (*Exterior ballistics, Spin-stabilized ammunition), Oscillation, Projectiles, Stability, Yaw, Numerical analysis.

The complete equations of motion of a spin-stabilized projectile are simplified by an approximation which averages out the fast nutational oscillation, but preserves the slow oscillatory behavior. It is shown by numerical calculations in a few examples that the resulting system predicts very well many details of the motion. (Author)
AD-656 053 HC$3.00 MF$0.65

STUDIES OF DENSITY CHANGES THROUGH FRONTAL SYSTEMS.
Army Electronics Command Fort Monmouth N J
For primary bibliographic entry see Field 4B.
AD-656 602 HC$3.00 MF$0.65

MATHEMATICAL AND EXPERIMENTAL INVESTIGATION OF THERMAL INITIATION OF EXPLOSION.
Progress rept. for 1 Apr 67-30 Jun 67,
Lehigh Univ Bethlehem Pa Inst of Research
George R. Jenkins. 13 Jul 67, 5p
Contract DA-28-017-AMC-1090 (A)

Descriptors: (*Explosions, Thermal properties), (*Azides, Decomposition), Lead compounds, Explosive materials, Reaction kinetics, Particle size.
Identifiers: Lead azide.

A summary is given of studies involving the decomposition of lead azide in the temperature range 210C to 243C.
AD-656 757 HC$3.00 MF$0.65

19G. Rockets

ROCKET INSTRUMENTATION FOR SOLAR ECLIPSE MEASUREMENTS - 12 NOVEMBER 1966,
Utah Univ Salt Lake City Upper Air Research Labs
For primary bibliographic entry see Field 3C.
AD-656 342 HC$3.00 MF$0.65

19H. Underwater Ordnance

FLOW NOISE AND DRAG MEASUREMENTS OF VEHICLE WITH COMPLIANT COATING,
Naval Ordnance Test Station, China Lake, Calif.
For primary bibliographic entry see Field 20D.
AD-444 376 HC$3.00

20. PHYSICS

20A. Acoustics

THEORY OF PURE TYPE-II SUPERCONDUCTORS IN HIGH MAGNETIC FIELDS. II. ULTRASONIC ATTENUATION,
California Univ San Diego La Jolla Dept of Physics
For primary bibliographic entry see Field 20C.
AD-655 895 Not available from CFSTI.

ATTENUATION CHARACTERISTICS OF EARMUFFS AT LOW AUDIO AND INFRASONIC FREQUENCIES.
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 6Q.
AD-655 939 HC$3.00 MF$0.65

RECENT RESULTS FROM THE STRAITS-OF-FLORIDA UNDERWATER-SOUND-PROPAGATION STUDY;
Miami Univ Fla Inst of Marine Science
J. C. Clark, R. Dann, and J. R. Yarnall. Nov 66, 7p
MU-ML-67229
Contract Nonr-840 (16)
Availability: Published in Journal of the Acoustical Society of America, v40 n5 p1195-7 1966.

Descriptors: (*Underwater sound, *Propagation), Diurnal variations, Sound signals, Tides, Detection, Underwater telephones, Stability, Demodulation, Amplitude modulation, Florida.

The phase-versus-time patterns of acoustic signals transmitted across the Straits of Florida in March 1966 show close similarities with corresponding patterns presented recently by Steinberg and Birdsall which were obtained 14 months earlier. Both diurnal and tidal periodicities appear in the patterns, and the phases of the tides were approximately the same during the two test intervals. The phase patterns at recently installed hydrophones located two to three miles from the sound source also show the characteristic periodicities observed at locations from across the Straits. All data obtained from this program so far lead to the conclusion that the signal phase, in sharp contrast to amplitude, is basically very stable, and that many of the fluctuations that do occur may be associated with large-scale environmental events. (Author)
AD-656 003 Not available from CFSTI.

UNDERWATER ACOUSTIC IMAGING.
Final rept., 1 Aug 66 - 30 Apr 67,
Lockheed Missiles and Space Co Palo Alto Calif
Lockheed Palo Alto Research Lab
Phillip S. Green. Jun 67, 59p Rept no. LMSC-4-17-67-5
Contract N00014-66-C-0353

Descriptors: (*Underwater sound, *Images), Sound signals, Particle size, Diffraction, Resolution, Image converters, Reflection, Visibility, Ocean bottom, Sedimentation, Ocean bottom topography, Analysis.

The report describes research in underwater acoustic imaging performed by Lockheed Missiles and Space Company during the nine-month period ending 30 April 1967. Included is a general discussion of the analytical approach used in studying acoustic image formation, as well as specific results which illustrate relationships between object characteristics, lens parameters, methods of insonification and acoustic image-converter parameters. A description is given of the theory of operation and current embodiment of the LMSC Acoustic Image Converter. Acoustic images realized with this converter are illustrated and discussed, with special attention given to those obtained under conditions of high turbidity, as well as with specularly reflecting objects. (Author)
AD-656 091 HC$3.00 MF$0.65

GROUP-VELOCITY DISPERSION DUE TO PULSE REFLECTION FROM A FREQUENCY-DEPENDENT BOUNDARY IMPEDANCE,
Pennsylvania State Univ University Park Dept of Physics
James N. Lange. 1967, 5p
AFOSR-67-1762
Grant AF-AFOSR-43-65
Prepared in cooperation with Oklahoma State Univ., Stillwater.
Availability: Published in The Journal of the Acoustical Society of America v40 n5 p998-1001 Nov 1966.

Descriptors: (*Ultrasonic radiation, Boundary value problems), (*Ultrasonic properties, Solids), Velocity, Theory, Phase shift, Resolution, Ultrasonic properties, Reflection, Barium compounds, Resonant frequency.

A time delay resulting from the reflection of a pulse from a frequency-dependent boundary impedance is computed and its effect on the measurement of ultrasonic group velocities is demonstrated experimentally. The time delay adds to the transit time of the pulse in the medium and its frequency dependence leads to an apparent dispersion of the group velocity. (Author)
AD-656 128 Not available from CFSTI.

TRANSDUCER CALIBRATION FACILITY AT SAN VICENTE LAKE,
Scripps Institution of Oceanography San Diego Calif Marine Physical Lab
For primary bibliographic entry see Field 14B.
AD-656 467 HC$3.00 MF$0.65

SCATTERING FROM TIME-VARYING ROUGH SURFACES.
Technical rept.,
Bell Telephone Labs Inc Whippany N J
B. E. Parkins. 12 Sep 66, 18p Rept no. TR-3
Contract N00014-66-C-0005
Prepared in cooperation with Western Electric Co., Inc., New York.

Descriptors: (*Sound signals, Scattering), (*Surfaces, Acoustic properties), Random variables, Attenuation, Surface properties, Surface roughness, Wave transmission, Mathematical analysis, Wind, Ocean waves.

The fading of a monochromatic acoustic plane wave, reradiated by a moving, rough surface, is

described using the far-zone spectral density of the reradiated pressure. This quantity is calculated using the method of physical optics, and specialized to the cases of slightly rough and very rough wind-generated seas, which are described by the Neumann-Pierson directional wave spectrum. The results show the dependence of the radiation spectrum upon wind speed, and the angles of incidence and observation relative to the wind direction. (Author)
AD-656 549 HC$3.00 MF$0.65

TIME DOMAIN ANALYSIS OF IMPULSE RESPONSE TRAINS.
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 9D.
AD-656 611 HC$3.00 MF$0.65

UNDERWATER SOUND PROPAGATION IN THE STRAITS OF FLORIDA: THE MIMI EXPERIMENT OF 3 AND 4 FEBRUARY 1965.
Technical rept.,
Michigan Univ Ann Arbor Cooley Electronics Lab
Rudolf Unger, and Raymond Veenkant. May 67, 90p Rept no. TR-183, 3674-12-T
Contract Nonr-1224 (36)

Descriptors: (*Underwater sound, Florida), Sound transmission, Computer programs, Data processing systems, Photographs, Tables, Maps.
Identifiers: MIMI.

An experiment was conducted on 3 and 4 February 1965 as a part of the study of underwater sound propagation in the Straits of Florida, called Project MIMI. A special pseudo-random modulation of a 420 Hz carrier was used to probe one-way multipath propagation. The non-modulated carrier was used for continuous-wave analysis. The report describes the experiments and the data processing, and presents the results of these analyses in photographical form. (Author)
AD-656 636 HC$3.00 MF$0.65

SOUND INSULATION OF WALL, FLOOR AND DOOR CONSTRUCTIONS,
National Bureau of Standards, Washington, D. C.
Raymond D. Berendt, and George Winzer. 30 Nov 64, 55p
Supersedes Supplements 1 and 2 of BMS-144. Hard copy available from Superintendent of Documents, GPO, Washington, D. C. 20402 $0.40.

Descriptors: (*Buildings, Acoustic properties), (*Acoustic insulation, Construction), Measurement, Urban areas, Doors, Walls, Floors, Sound transmission, Structures, Noise, Sound pitch.

The data obtained at the National Bureau of Standards on the sound insulating properties of building structures are summarized. The results of the two previous Supplements to BMS Report 144 (1955) are included, together with later results obtained through January 1964. Single figure ratings, STC and INR, for airborne sound transmission and impact sound transmission, respectively, as well as the octave frequency band spectra of impact noise, are included as additional information. A brief description of the sound-measuring techniques is given. (Author)
NBS-MONO-77 HC$0.40 MF$0.65

REFRACTION OF SOUND BY JET FLOW AND JET TEMPERATURE. EXTENSION OF TEMPERATURE RANGE PARAMETERS AND DEVELOPMENT OF THEORY.
Toronto Univ. (Ontario). Institute for Aerospace Studies.
E. Grande. Aug 67, 52p NASA-CR-840, UTIAS-TN-110
Grant NSG-661, Contract AFOSR-672-64

Descriptors: *Air jet, *Refraction, *Sound measurement, Air, Field, Jet, Measurement, Nitrogen, Noise, Omnidirectional, Plot, Polar, Sound, Source, Temperature, Velocity.

For abstract, see STAR 05 18.
N67-31985 HC$3.00 MF$0.65

20B. Crystallography

ORGANOMETALLIC SULFUR COMPLEXES. VI. THE MOLECULAR STRUCTURE OF A TRICYCLIC COMPLEX, TRICOBALT ENNEACARBONYL SULFIDE,
Wisconsin Univ Madison Dept of Chemistry
For primary bibliographic entry see Field 7A.
AD-655 896 Not available from CFSTI.

THE STUDY OF THE GROWTH MECHANISMS OF ALLOY FILAMENTARY CRYSTALS (WHISKERS) GROWN FROM SOLIDS.
Final summary rept.,
California Univ Los Angeles Dept of Engineering
George Sines. Jun 67, 19p Rept no. 67-26
Contract Nonr-233 (77)

Descriptors: (*Whiskers (Crystals), *Crystal growth), Transport properties, Indium alloys, Lead alloys, Tin alloys, Stresses, X-ray diffraction analysis, Diffusion, Dislocations, Theory.

In an attempt to discover the mechanism by which the transport of atoms occurs under extreme microscopic stress gradients, alloy filamentary crystals were grown from the solid plating subjected to lateral compression. Enrichment of one species in the filamentary crystal would be expected if diffusion were the controlling mechanism. X-ray lattice diffraction measurement of the atomic spacing of Pb-In and Sn-In alloys appears promising. Also electron microprobe appears promising if shape and size effects can be calibrated. Absolute composition measurements are still inconclusive but the variation of composition along several filamentary crystals was less than 1%. (Author)
AD-655 917 HC$3.00 MF$0.65

PREPARATION AND STRUCTURE OF (CH3SFe2 (CO)6)2S: AN ORGANOMETALLIC COMPLEX CONTAINING A TETRAHEDRAL-LIKE SULFUR ATOM COORDINATED TO FOUR METAL ATOMS,
Wisconsin Univ Madison Dept of Chemistry
For primary bibliographic entry see Field 7B.
AD-655 958 Not available from CFSTI.

THE CRYSTAL STRUCTURE OF RARE-EARTH MONOSILICIDES.
Revised ed.,
Texas Univ Austin Dept of Chemistry
A. Raman, and H. Steinfink. 26 Sep 66, 6p
AFOSR-67-1752
Grants AF-AFOSR-806-65, NSF-GP-2029
Availability: Published in Acta Crystallographics v22 pt5 p688-91 May 1967.

Descriptors: (*Rare earth compounds, *Crystal structure), (*Silicides, Crystal structure), Lanthanum compounds, Neodymium compounds, Gadolinium compounds, Holmium compounds, Erbium compounds, Single crystals, X-ray diffraction analysis, Seebeck effect, Crystal lattices.
Identifiers: Erbium silicides, Holmium silicides, Gadolinium silicides, Lanthanum silicides, Neodymium silicides.

The crystal structures of LaSi, NdSi, GdSi, HoSi, and ErSi were redetermined by means of single-crystal X-ray diffraction data. The rare earth monatomic structures crystallizing with the FeB and CrB type structures are compared with similar crystallizations found for transition metal compounds and a valence electron transfer is postulated to account for the CrB-type structures. (Author)
AD-655 995 Not available from CFSTI.

ORDERING IN LIQUID CRYSTALS OWING TO ELECTRIC AND MAGNETIC FIELDS,
Maine Univ Orono Dept of Physics
For primary bibliographic entry see Field 7D.
AD-655 997 Not available from CFSTI.

CONSOLIDATED SEMIANNUAL PROGRESS REPORT.
University of Southern California Los Angeles Electronic Sciences Lab
For primary bibliographic entry see Field 20L.
AD-656 025 HC$3.00 MF$0.65

CRYSTALLIZATION OF Fe (NH4)26H2O ON A SEED IN MAGNETIC FIELDS UP TO 140 kOe,
Massachusetts Inst of Tech Cambridge National Magnet Lab
For primary bibliographic entry see Field 20L.
AD-656 123 Not available from CFSTI.

THE STRUCTURE OF THE M'-PHASE OF YTaO4, A THIRD FERGUSONITE POLYMORPH,
Aerospace Corp El Segundo Calif Labs Div
Gerard M. Wolten. Feb 67, 25p Rept no. TR-1001 (2250-10)-5
SSD-TR-67-66
Contract AF 04 (695)-1001

Descriptors: (*Yttrium compounds, *Crystal structure), (*Tantalum compounds, Crystal structure), Phase studies, Minerals, X-ray diffraction analysis, Oxides.
Identifiers: Fergusonite, Yttrium tantalates.

The M' -phase of fergusonite is closely related to the other known monoclinic form (M-phase), except that it has a halved b-axis and its space group is P2/a instead of I2. The structure of the M' -phase was determined for YTaO4 from three-dimensional diffractometer data, and its relationship to the other polymorphs is discussed. The lattice parameters of M' -YTaO are: a = 5.292A, b = 5.451A, c = 5.110A, beta = 96.44 deg., Z = 2. (Author)
AD-656 335 HC$3.00 MF$0.65

CALCULATION OF ELASTIC CONSTANTS OF NaF,
Uppsala Univ (Sweden) Inst of Physics
J. Vallin, G. Pettersson, J. L. Calais, and K. Mansikka. 1967, 18p
AFOSR-67-1821
Contract AF 61 (052)-937
Availability: Published in Arkiv fuer Fysik v34 n18 p199-213 1967.

Descriptors: (*Sodium compounds, Elasticity), (*Crystals, Elasticity), Molecular association, Crystal lattices, Fluorides, Molecular orbitals, Wave functions, Ions, Interactions, Compressive properties, Sweden.
Identifiers: Sodium fluoride.

The cohesive energy, the equilibrium distance, and the elastic constants of NaF were calculated by Lowdin's method. The accurate SCF-functions for the free ions recently obtained by Clementi were used as raw material. Both the interactions between nearest positive-negative neighbours and those between nearest negative-negative neighbours were calculated, and it was found that the latter ones are quite important. The results are compared to the recently obtained experimental data for NaF. (Author)
AD-656 363 Not available from CFSTI.

STUDY OF POLYTYPIC PHASE RELATIONS AMONG COMPLEX INORGANIC STRUCTURES.
Semi-annual rept. no. 4, 1 Nov 66-30 Apr 67,
Michigan Univ Ann Arbor Dept of Geology and Mineralogy
Donald R. Peacor. Jul 67, 13p Rept no. 07325-4-T
ECOM-01338-4
Contract DA-28-043-AMC-01338 (E)
See also AD-648 433.

Descriptors: (*Crystal structures, Phase studies), (*Ferrites, Crystal structure), Spinels, Minerials, X-ray diffraction analysis, Tin compounds, Lead compounds.
Identifiers: Nigerite, Plumboferrite, Senaite.

Three-dimensional intensity data were measured for the plumboferrite substructure. These data result in a minimum function which confirms that the plumboferrite structure is a derivative structure of that of magnetoplumbite which in turn is isotypic with Ba-ferrite, BaFe12O19. A new set of three-dimensional intensity data for nigerite similarly shows that the nigerite structure is a derivative of the spinel structure. Further work on senaite led to one relatively complete trial structure. Detailed progress on all three of these structures determinations is described. (Author)
AD-656 497 HC$3.00 MF$0.65

CRYSTAL STRUCTURES, THEIR DEFECTS AND TRANSFORMATIONS.
Final progress rept., 1 Jul 64-30 Jun 67,
Chicago Univ Ill
Charles S. Barrett. 30 Jun 67, 7p
AROD-4886:10-MC
Grant DA-ARO (D)-31-124-G542

Descriptors: (*Crystal structure, X-ray diffraction analysis), (*Crystal lattice defects, Interactions), Phase studies, Magnetic materials, Metals, Semiconductors, Solidified gases.

A brief summary is given of a research program which developed three types of experimental information: (a) precision data on the structure and unit cell dimensions of metallic and non-metallic materials over a range of temperatures, (b) information on phase changes and on phase diagrams for the region of temperature below room temperature for solids with van der Waals binding, and (c) transformation characteristics and imperfection characteristics for some of the more interesting van der Waals solids.
AD-656 527 HC$3.00 MF$0.65

OXYGEN-FREE ALUMINUM DOPED GERMANIUM FOR LITHIUM DRIFTING,
Simtec Ltd Montreal (Quebec)
For primary bibliographic entry see Field 18D.
AD-656 671 Not available from CFSTI.

X-RAY SCATTERING BIBLIOGRAPHY.
Kaman Nuclear Colorado Springs Colo
For primary bibliographic entry see Field 20H.
AD-656 759 HC$3.00 MF$0.65

INVESTIGATION OF ELECTRON BEAM PROCESSING OF ALUMINUM OXIDE AND RELATED MATERIALS.
Materials Research Corp Orangeburg N Y
For primary bibliographic entry see Field 11B.
AD-656 769 HC$3.00 MF$0.65

20C. Electricity and Magnetism

THE CHANGE IN ELECTRICAL RESISTIVITY WITH PLASTIC DEFORMATION OF COPPER AT DIFFERENT STRAIN RATES,
Clarkson Coll of Technology Potsdam N Y Dept of Physics
Martin C. Martin, and Kenneth F. Welton. 27 Feb 67, 5p
AFOSR-67-1680
Grant AF-AFOSR-794-65
Availability: Published in Canadian Journal of Physics v45 p226-8 1967.

Descriptors: (*Resistance (Electrical), Copper), (*Deformation, Copper), Plasticity, Strain (Mechanics).

The functional increase in electrical resistivity with plastic strain was measured for 99.999% pure copper polycrystalline wires at -196 degrees C and at different strain rates. The samples were annealed in an argon atmosphere, chemically cleaned and deformed by a constant strain apparatus. The increase in electrical resistivity was found to be independent of strain rate within the range investigated and followed the power law predicted by H. G. van Buren.
AD-655 858 Not available from CFSTI.

FOUNDATIONAL RESEARCH PROJECTS, JANUARY-MARCH 1967.
Naval Ordnance Lab Corona Calif
For primary bibliographic entry see Field 20L.
AD-655 889 HC$3.00 MF$0.65

THEORY OF PURE TYPE-II SUPERCONDUCTORS IN HIGH MAGNETIC FIELDS. II. ULTRASONIC ATTENUATION,
California Univ San Diego La Jolla Dept of Physics
Kazumi Maki. 26 Sep 66, 9p
AFOSR-67-1744
Grant AF-AFOSR-610-64
Availability: Published in The Physical Review v156 n2 p437-44 Apr 10 1967.

Descriptors: (*Superconductors, Ultrasonic properties), Magnetic fields, Anisotropy, Correlation techniques, Electric currents, Transport properties.
Identifiers: Quasiparticles.

We propose here a theory of pure type-II superconductors in high superconductors in high magnetic fields. Making use of the guess that the effect of the magnetic field on a pure type-II superconductor in a high field is similar to that of a transport current, we circumvent the difficulty associated with the expansion in powers of the order parameter. As a application of this conjecture, we calculate here the ultrasonic attenuation coefficients in the gapless region of a pure type-II superconductor. The attenuation coefficients decrease sharply in the superconducting region as the square root of the quantity (H (subscript c2)-H), where H is the external field, and are strongly anisotropic -- a simple manifestation of the anisotropy in the excitation spectrum of quasiparticles.
AD-655 895 Not available from CFSTI.

HELICON MODES IN PURE TYPE-II SUPERCONDUCTORS IN THE HIGH-FIELD REGION,
California Univ San Diego La Jolla Dept of Physics
Christiane Caroli, and Kazumi Maki. 8 Mar 67, 6p
AFOSR-67-1743
Grant AF-AFOSR-610-64
Availability: Published in Physical Review Letters v18 n17 p698-700 Apr 24 1967.

Descriptors: (*Superconductors, Resonance), Niobium, Magnetic fields, Electric currents, Band theory of solids.
Identifiers: Helicons.

The dispersion relation for helicon modes in pure type-II superconductors close to their upper critical field H subscript c2 is derived, using an expression of the complex conductivity which includes the effect of fluctuations of the order parameter. The dispersion relation has the same form as in the normal state, provided one replaces the number N of carriers of the normal metal by an effective number of normal carriers N subscript n. N subscript n increases sharply in the superconducting state in the vicinity of the transition point, due to coherence effects. This implies that omega (subscript hel) (q) should decrease sharply below H subscript c2. (Author)
AD-655 952 Not available from CFSTI.

DRIFT VELOCITY AND ENERGY OF ELECTRONS IN LIQUID ARGON,
Chicago Univ Ill
Bret Halpern, John Lekner, Stuart A. Rice, and Robert Gomer. 14 Nov 66, 4p
AFOSR-67-1673
Grant AF-AFOSR-781-67
Availability: Published in The Physical Review v156 n2 p351-2 Apr 10 1967.

Descriptors: (*Liquefied gases, Transport properties), (*Argon, Transport properties), Electrons, Injection, Velocity, Energy, Work functions, Electric fields.

Measurements are reported of the energy required for injection of an electron into liquid argon and of the drift velocity of electrons in liquid argon at moderate field strength. It is found that the barrier to electron injection is -0.33 eV, in moderately good agreement with a theoretical estimate of -0.45 eV. The observed field dependence of the drift velocity is in good agreement with the recent calculations of Lekner. (Author)
AD-655 955 Not available from CFSTI.

GREEN'S THEOREM AND INVARIANT TRANSFORMATIONS,
Syracuse Univ N Y Dept of Physics
For primary bibliographic entry see Field 20J.
AD-655 964 HC$3.00 MF$0.65

PROXIMITY EFFECT IN SUPERCONDUCTING CONTACTS BY ELECTRON TUNNELLING,
California Univ San Diego La Jolla Dept of Physics
S. Gygax, K. Maki, and T. Claeson. 25 Oct 66, 17p
AFOSR-67-1732
Grant AF-AFOSR-631-64
Research supported in part by Statens Naturvetenskapliga Forskningsrad. Prepared in cooperation with Chalmers Univ. of Technology, Gothenburg (Sweden) Dept. of Physics.
Availability: Published in Physik Kondens. Materie, n6 p23-37 1967.

Descriptors: (*Superconductivity, *Tunneling (Electronics)), Band theory of solids, Films, Lead, Solid state physics, Transition temperature, Paramagnetic materials.

The excitation spectrum in superconducting lead in the presence of a metallic contact has been investigated. Conductance versus voltage curves disagree with those computed from the BCS theory but agree much better with curves calculated from a depairing theory. The experiments demonstrate the existence of a pair breaking mechanism induced by metallic contact. Tunnelling into the normal side of the double layer gave less conclusive results. Due to a pair enhancing effect, superconductivity exists in the otherwise normal metal, but it cannot be described by the simple BCS picture. A somewhat complicated temperature dependence was registered for the sharpness of the conductance versus voltage curves. (Author)
AD-655 965 Not available from CFSTI.

SOLID-STATE AND MOLECULAR THEORY GROUP.
Massachusetts Inst of Tech Cambridge

For primary bibliographic entry see Field 20L.
AD-655 966 HC$3.00 MF$0.65

ANISOTROPY IN TUNNELING DENSITY OF STATES IN PURE TYPE-II SUPERCONDUCTORS,
California Univ San Diego La Jolla Dept of Physics
Kazumi Maki. 26 Jan 67, 4p
AFOSR-67-1742
Grant AF-AFOSR-610-64
Availability: Published in Physical Review Letters v18 n20 p835-6 May 15 1967.

Descriptors: (*Superconductors, Tunneling (Electronics)), Transport properties, Anisotropy, Magnetic fields, Electric currents, Theory.
Identifiers: Quasiparticles.

For pure type-II superconductors in a high magnetic field, the density of states is anisotropic (i.e., depends on the angle theta between the magnetic field and the direction of propagation of quasiparticles). This angle dependent density of states, which is the one coming into play in a tunneling experiment, is calculated. It is found that it can be expanded in powers of (the absolute value of delta) squared, subscript Ay (delta being the order parameter), except for theta = O where it has a BCS-type singularity.
AD-655 968 Not available from CFSTI.

ALTERNATING CURRENT JOSEPHSON EFFECT IN SUPERFLUID HELIUM,
Western Reserve Univ Cleveland Ohio
B. M. Khorana, and B. S. Chandrasekhar. 3 Jan 67, 4p
AFOSR-67-1772
Grant AF-AFOSR-565-66
Availability: Published in Physical Review Letters v18 n7 p230-2 Feb 13 1967.

Descriptors: (*Superconductivity, *Tunneling (Electronics)), (*Superfluidity, Superconductivity), Helium, Transport properties, Alternating current, Acoustic properties, Vortices, Cryogenics.
Identifiers: Josephson effect.

A repetition, with a few modifications, of an experiment first performed by Richards and Anderson (Phys. Rev. Letters v14 p540 1965) concerning the motion of quantitized vortices across a hole connecting two volumes of superfluid helium, provided an indication of the great stability of the phenomenon of 'sticking' and yielded further confirmation of the ac Josephson effect in helium II.
AD-655 993 Not available from CFSTI.

USE OF POINT CONTACTS TO OBTAIN DIRECT EVIDENCE OF FLUX MOTION IN SUPERCONDUCTORS,
Western Reserve Univ Cleveland Ohio
B. S. Chandrasekhar, D. E. Farrell, and S. Huang. 14 Nov 66, 4p
AFOSR-67-1770
Grant AF-AFOSR-565-66
Availability: Published in Physical Review Letters v18 n2 p43-5 Jan 9 1967.

Descriptors: (*Superconductors, Transport properties), (*Resistance (Electrical), Superconductors), Stability, Electric currents, Magnetic fields, Anomalies.

Recently, a number of experiments have claimed to provide evidence that the resistive state of superconductors is a dynamic one, in the sense that the regions of normal material, domains containing one or more flux quanta, are supposed to be set into continuous motion by the transport current. Further, in a related experiment, Pearl has attempted to establish that domain motion is associated with a potential difference in the case that is produced by a changing magnetic field, rather than a steady transport current. However, it was later shown that the potentials observed in Pearl's experiment were not necessarily connected with domain motion. The present report describes experiments which indicated that uniform resistance fluctuations can occur when current is injected at a point into a superconductor.
AD-655 994 Not available from CFSTI.

ELECTRODELESS DETERMINATION OF SEMICONDUCTOR CONDUCTIVITY FROM TE01-MODE REFLECTIVITY,
Minnesota Univ Minneapolis Dept of Mathematics
K. S. Champlin, J. D. Holm, and G. H. Glover.
8 Aug 66, 5p
AFOSR-67-1645
Grants AF-AFOSR-606-64, NSF-GP-2360
Availability: Published in Journal of Applied Physics v38 n1 p96-8 Jan 1967.

Descriptors: (*Semiconductors, Electrical conductance), Microwaves, Waveguides, Measurement, Germanium, Experimental data.

Microwave conductivity of semiconductors determined from transmission or reflection of the dominant mode of rectangular waveguide may contain a significant error caused by the impedance of the contact between the sample and the broad waveguide wall. This error increases with increasing bulk conductivity. The present paper describes a technique which eliminates this source of error by utilizing the TE (subscript 01, superscript o) mode of circular waveguide in a reflection coefficient bridge. Measurements of intrinsic germanium at 48 GHz show no contact influence over the conductivity range between 2 and 2000 moh/m. In contrast, the conductivity measured with a conventional rectangular waveguide transmission bridge saturates at about 50 mho/m. (Author)
AD-656 014 Not available from CFSTI.

ELECTRON AND PHONON EFFECTS IN SUPERCONDUCTING FCC LEAD-BASED ALLOYS,
Western Reserve Univ Cleveland Ohio
For primary bibliographic entry see Field 20L.
AD-656 019 Not available from CFSTI.

QUANTUM LIMIT GALVANOMAGNETIC PHENOMENA IN n-InSb,
Massachusetts Inst of Tech Cambridge National Magnet Lab
For primary bibliographic entry see Field 20L.
AD-656 121 Not available from CFSTI.

MICROWAVE FLUX-GLOW DISSIPATION IN PARAMAGNETICALLY LIMITED Ti-V ALLOYS.
Massachusetts Inst of Tech Cambridge National Magnet Lab
For primary bibliographic entry see Field 11F.
AD-656 125 Not available from CFSTI.

ON TRANSITION FUNCTIONS OCCURRING IN THE THEORY OF DIFFRACTION IN INHOMOGENEOUS MEDIA,
Polytechnic Inst of Brooklyn N Y Dept of Electrophysics
For primary bibliographic entry see Field 20F.
AD-656 217 Not available from CFSTI.

HEAT CAPACITY OF Mn (HCOO)2.2H2O BETWEEN 1.4 AND 20K.
Carnegie Inst of Tech Pittsburgh Pa Dept of Physics
For primary bibliographic entry see Field 20L.
AD-656 400 Not available from CFSTI.

LEAKAGE OF ELECTROMAGNETIC ENERGY FROM COAXIAL CABLE STRUCTURES,
Army Signal Engineering Labs Fort Monmouth N J
For primary bibliographic entry see Field 9A.
AD-656 424 Not available from CFSTI.

CONSTRICTED HYSTERESIS LOOPS OF BARIUM TITANATE.
Research rept. Jun 62-Dec 63,
Navy Electronics Lab San Diego Calif
G. W. Marks, and R. D. Redin. 20 Apr 67, 38p
Rept no. NEL-1455

Descriptors: (*Ferroelectric materials, *Hysteresis), (*Barium compounds, Hysteresis), (*Titanates, Hysteresis), Transducers, Ceramic materials, Polarization, Electric fields, Electric fields.
Identifiers: Barium titanate.

An empirical analysis was made of the change in polarization with time for a constricted hysteresis loop at fixed field strengths. Synthetic constricted loops were obtained by placing two polarized disks in antiparallel and applying a high alternating potential. The loops were studied by means of oscillograms taken during the deconstriction period. Hysteresis loop theory was extended and equations were derived that partially explain the results. (Author)
AD-656 585 HC$3.00 MF$0.65

MEASUREMENT OF LINEWIDTH OF SINGLE CRYSTAL FERRITES USING A SHORTED TRANSMISSION LINE.
Technical rept.,
Army Electronics Command Fort Monmouth N J
I. Bady. May 67, 51p Rept no. ECOM-2849

Descriptors: (*Ferrites, Resonant frequency), (*Ferromagnetic materials, Microwaves), Spheres, Hysteresis, Single crystals, Magnetic fields, Measurement, Transmission lines, Magnetic properties, Wave transmission.
Identifiers: Linewidth.

A technique is described for measuring the linewidth of single crystals of ferrites which is accurate, rapid, easy to use, and can be readily adapted to give a visual display of the resonance curve. At C-band, the normalized equivalent resistance due to the ferrite sphere at resonance (expressed as a parallel component) agrees well with theory whether the sphere is undercoupled, critically coupled, or overcoupled to the transmission line. However, a substantial reactive component is present when the sphere is near critical coupling or overcoupled, and this is contrary to theory. It is concluded that measurement of linewidth should be taken under conditions where the sphere is substantially undercoupled.
AD-656 603 HC$3.00 MF$0.65

SIZE EFFECTS IN THE TEMPERATURE VARIATION OF ELECTRICAL CONDUCTIVITY OF EPITAXIAL GOLD FILMS,
Illinois Univ Urbana Coordinated Science Lab
For primary bibliographic entry see Field 7D.
AD-656 609 HC$3.00 MF$0.65

EFFECTS OF FINITE LATTICE HEAT CAPACITY ON SPIN LATTICE RELAXATION: THEORY AND NUMERICAL ANALYSIS,
National Bureau of Standards, Boulder, Colo. Inst. for Basic Standards.
For primary bibliographic entry see Field 20L.
NBS-MONO-102 MF$0.65

THEORY OF CURRENTS AND VOLTAGES OF A RECTIFIER OR INVERTER CONNECTED TO A SYNCHRONOUS MACHINE.
Zurich Univ. (Switzerland). Swiss Federal Inst. of Technology.

M. A. Mansour. 1966, 135p
Its Dissertation No. 3773

Descriptors: *Inverter, *Rectifier, *Voltage, Circuit, Coil, Current, Leakage, Power, Stability, Static, Synchronous, Theory, Torque.

For abstract, see STAR 05 18.
N67-31875 HC$3.00 MF$0.65

MOTION OF MAGNETIC FLUX THROUGH SUPERCONDUCTING STRIPS.
Rice Univ., Houston, Tex.
W. V. Houston, and D. R. Smith. 1967, 19p
NASA-CR-86981
Grant NSG-6

Descriptors: *Electric resistance, *Magnetic field, *Superconductor, Dissipation, Electric, Energy, Field, Film, Flux, Indium, Magnetic, Mechanical, Motion, Pendulum, Resistance, Strip, Torsion, Velocity.

For abstract, see STAR 05 18.
N67-32279 HC$3.00 MF$0.65

ELECTRON PHYSICS TABLES,
National Bureau of Standards, Washington, D. C.
For primary bibliographic entry see Field 20H.
PB-175 659 HC$3.00 MF$0.65

20D. Fluid Mechanics

FLOW NOISE AND DRAG MEASUREMENTS OF VEHICLE WITH COMPLIANT COATING,
Naval Ordnance Test Station, China Lake, Calif.
C. R. Nisewanger. Jul 64, 25p NOTS-TP-3510
NAVWEPS-8518

Descriptors: (*Torpedo models, Rubber coatings), Design, Drag, Liquids, Aerodynamic noise, Turbulent boundary layer, Pressure, Laminar flow, Instrumentation, Piezoelectric transducers, Test methods, Skin friction.

The forward portion of a buoyancy-propelled test vehicle was coated with 'Lamiflo,' a liquid-filled compliant rubger skin intended to reduce drag. Self-noise and drag measurements were compared with those of the bare vehicle. The coating increased the drag slightly and shifted the transition forward, possibly because of a surface irregularity. Self-noise in the 31.4-kc band was decreased with a filling liquid having a viscosity of 2,000 centipoise but was not decreased with water filling. Turbulent boundary-layer pressure fluctuation levels (measured under the skin) were generally lower than those of the bare body, and the lower frequencies were attenuated more with the high-viscosity liquid than with water. (Author)
AD-444 376 HC$3.00

A FINITE-DIFFERENCE METHOD SOLUTION OF NON-SIMILAR, EQUILIBRIUM AND NON-EQUILIBRIUM AIR, BOUNDARY LAYER EQUATIONS WITH LAMINAR AND TURBULENT VISCOSITY MODELS. PART I. ANALYSIS.
General Applied Science Labs., Inc., Westbury, N. Y.
For primary bibliographic entry see Field 1A.
AD-474 645 HC$3.00 MF$0.65

TWO-DIMENSIONAL HIGH SPEED FLOW OF RADIATING GAS.
Research rept.,
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
Prem K. Khosla. Feb 66, 36p
PIBAL-956
Contract Nonr-839 (34)

Descriptors: (*Thermal radiation, *Supersonic flow), Aerodynamic heating, Airfoils, Pressure, Heat transfer, Thermodynamics, Hypersonic flow, Partial differential equations, Equations of motion, Errors, Aerodynamic configurations, Drag, Energy, Fluid dynamic properties, Slender bodies, Gases, Two-dimensional flow.

In high speed gas dynamics the analysis of two-dimensional flows of hot gases where the effect of radiation as a mode of energy transfer cannot be neglected, is extremely difficult due to the integro-differential nature of the governing equations. To date, most of the existing literature on radiation gas dynamics is confined to the study of two asymptotic cases of thin or thick gas. For arbitrary optical properties, the integro-differential equations can be reduced to partial differential equations by applying the differential or the so-called Milne Eddington approximation, which is well-known in astorphysical literature. In the case of supersonic flows even this approximation does not simplify the analysis because the governing equations are elliptic in character. This elliptic nature of the equations does not allow the use of the methods already developed for nonradiating gaseous flows where the equations are hyperbolic in nature. This paper deals with certain flow situations where two characteristic lengths are available in the system. An order of magnitude analysis, based on two lengths and the mean free path of radiation, has been carried out and the basic equations of the flow have been simplified to the equations that are parabolic in character. This (after applying the Milne-Eddington approximation) is then applied to the supersonic flow past a wavy wall. Within the parametric range of the applicability a comparison of the results of the present investigation with the exact known results of Cheng shows good agreement.
AD-481 002 HC$3.00 MF$0.65

THE DESIGN OF TANKS FOR USE IN AN ACTIVE TANK SYSTEM.
Technical rept.,
Hydronautics Inc Laurel Md
William C. Webster. Jul 67, 74p Rept no. Hydro-TR-490-3
Contract NObs-90164

Descriptors: (*Ballast tanks, *Sloshing), Design, Equations of motion, Reynolds number, Turbulence, Stabilization systems, Geometric forms, Damping.

Detailed consideration is given to the design of the tanks for activated anti-roll tank installations. The tanks considered are of the U-tube type. Methods are presented for selecting the geometry of the tank to obtain the proper tank size frequency. The computation of the damping is made from standard, empirical relations used in hydraulics. In addition, the formulae for computing sloshing are also presented. (Author)
AD-655 866 HC$3.00 MF$0.65

ON THE ASYMPTOTIC FORM OF THE STREAM FUNCTION FOR THE FLOW OF AN OSEEN-LIKE FLUID PAST A PARABOLIC CYLINDER,
Johns Hopkins Univ Baltimore Md Dept of Mechanics
Carl Kaplan. Jun 67, 32p
AFOSR-67-1346
Contract AF 49 (638)-1303

Descriptors: (*Cylindrical bodies, *Fluid flow), Incompressible flow, Approximation (Mathematics), Viscosity, Flat plate models, Two-dimensional flow.

The asymptotic behavior of the flow at a large distance from a parabolic cylindrical obstacle immersed in the uniform flow of an incompressible viscous fluid is considered on the basis of a successive approximation method, with the Oseen solution as the first step. Only dominant terms are retained in the expression for the stream function. Four steps in the approximation procedure yield a parabolic displacement surface which for the degenerate case; namely, the semi-infinite flat plate, approaches very closely the Blasius result and thus demonstrates the validity of the Oseen type of successive approximations in dealing with the Navier-Stokes equations. (Author)
AD-655 894 HC$3.00 MF$0.65

HYDRODYNAMIC FORCES ON AN ANCHOR CABLE,
David Taylor Model Basin Washington D C
For primary bibliographic entry see Field 13J.
AD-655 959 HC$3.00 MF$0.65

ALTERNATING CURRENT JOSEPHSON EFFECT IN SUPERFLUID HELIUM,
Western Reserve Univ Cleveland Ohio
For primary bibliographic entry see Field 20C.
AD-655 993 Not available from CFSTI.

KINETIC EQUATIONS AND DENSITY EXPANSIONS: EXACTLY SOLVABLE ONE-DIMENSIONAL SYSTEM,
Yeshiva Univ New York Belfer Graduate School of Science
For primary bibliographic entry see Field 7D.
AD-656 012 Not available from CFSTI.

ENSEMBLE DEPENDENCE OF FLUCTUATIONS WITH APPLICATION TO MACHINE COMPUTATIONS,
Yeshiva Univ New York Belfer Graduate School of Science
For primary bibliographic entry see Field 7D.
AD-656 013 Not available from CFSTI.

AN EXPERIMENTAL STUDY OF 'TAYLOR COLUMNS'.
Woods Hole Oceanographic Institution Mass
For primary bibliographic entry see Field 3A.
AD-656 027 Not available from CFSTI.

THE ENERGETICS OF ION TRANSPORT IN THE PRESENCE OF POLYMERIC COMPOUNDS WHICH ALTER THE RHEOLOGICAL PROPERTIES OF WATER.
Little (Arthur D) Inc Cambridge Mass
For primary bibliographic entry see Field 7D.
AD-656 058 HC$3.00 MF$0.65

INVESTIGATION OF A THEORY FOR THE STRUCTURE OF THE VISCOUS SUBLAYER IN WALL TURBULENCE,
Pennsylvania State Univ University Park Dept of Aerospace Engineering
Roy Cassel Elswick, Jr. Jun 67, 92p
Grant Nonr (G)-00043-65

Descriptors: (*Turbulent boundary layer, Theory), Walls, Mathematical analysis, Viscosity, Turbulence, Incompressible flow, Shear stresses, Vortices, Energy.

Based on the assumption of equilibrium of the average rate of change of the total turbulent energy, differential eigenvalue equations for the structure of finite-amplitude disturbances invariant in the streamwise direction are obtained. The minimum viscous sublayer thickness is determined using a simplified form of the equations. The minimum critical thickness non-dimensionalized by shear velocity and kinematic viscosity is found to be 4.69. The numerical results are also compared with the measurements in the sublayer by Bakewell (1966). It is suggested that the so-called 'energy-containing range' of the spectrum may be associated with the large eddy structure. (Author)
AD-656 089 HC$3.00 MF$0.65

SIMILARITY AND THE TURBULENT ENERGY SPECTRUM,
Pennsylvania State Univ University Park
J. L. Lumley. 24 Aug 66, 4p
Contract Nonr-656 (33)
Availability: Published in The Physics of Fluids v10 n4 p855-8 Apr 1967.

Descriptors: (*Fluid mechanics, Turbulence), Energy, Distribution, Viscosity, Equations of motion, Buoyancy, Magnetic fields, Elasticity, Fluid flow.
Identifiers: Similarity theory.

Spherically averaged spectral densities of quantities appearing in the turbulent energy equation are assumed to be locally similar: i.e., to depend on external parameters in a similar way when referred to local scales of flux and length. Dynamical equations are given for the influence of production (including anisotropy), viscosity, buoyancy, magnetic field, and elasticity. General solutions of these equations are obtained implicitly, and the leading term in a series expansion explicitly. This similarity is shown to be a generalization of the ideas of Kolmogorov, of the modified Onsager cascade used by Corrsin, and of the formulation of Kovasznay and Shur for the influence of viscosity and buoyancy. In the case of viscosity, the prediction of a spectral cutoff by the Kovasznay formulation is seen to be misleading, and due to the retention of only the leading term in the expansion. (Author)
AD-656 147 Not available from CFSTI.

INVARIANTS IN TURBULENT FLOW,
Pennsylvania State Univ University Park
J. L. Lumley. 15 Aug 66, 3p
Revision of manuscript submitted 13 Jul 66. Research supported by Bureau of Naval Weapons.
Availability: Published in The Physics of Fluids v9 n11 p2111-3 Nov 1966.

Descriptors: (*Turbulence, Invariance), Fluid flow, Integrals, Equations of motion, Incompressible flow.

As suggested by Phillips, it is shown that in inhomogeneous turbulent flow certain integrals are invariant which are related to the Loitsianskii integral. Under appropriate circumstances, the Loitsianskii invariant is restored (when properly interpreted). (Author)
AD-656 149 Not available from CFSTI.

REPLY BY AUTHOR TO M. H. BERTRAM'S COMMENT,
Aerospace Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 1A.
AD-656 152 Not available from CFSTI.

ON THE METHOD OF INTEGRAL RELATIONS.
Revised ed.,
Aerospace Research Labs Wright-Patterson AFB Ohio
Howard E. Bethel. 14 Oct 66, 6p Rept no. ARL-67-0100
Revision of manuscript submitted 11 Jul 66.
Availability: Published in AIAA Journal p802-3 Apr 1967.

Descriptors: (*Flow separation, Integral equations), Interpolation, Integration, Boundary layer, Flat plate models, Flow fields, Numerical methods and procedures.

The purpose of the note is to suggest that the use of two interpolation relations is unsatisfactory in the preseparation region for higher orders of approximation N = or > 3. Alternate procedures are mentioned. (Author)
AD-656 158 Not available from CFSTI.

AN EXPERIMENTAL AND THEORETICAL INVESTIGATION OF THE TURBULENT FAR WAKE.
Revised ed.,
New York Univ N Y
Victor Zakkay, and Herbert Fox. 7 Oct 66, 12p
ARL-67-0104
Contracts AF 33 (615)-2215, DA-31-124-ARO (D)-259
Revision of manuscript submitted 13 May 66.
Availability: Published in AIAA Journal v5 n3 p568-74 Mar 1967.

Descriptors: (*Wake, *Turbulence), Hypersonic flow, Boundary layer, Jet mixing flow, Transport properties, Mathematical analysis, Diffusion, Stagnation point.

A theoretical and an experimental investigation of the turbulent far wake is carried out. The experiments were conducted at M = 12 and a Reynolds number of 450,000/ft based on freestream conditions. The wall-to-stagnation-temperature ratio was 0.265. The theoretical analysis was conducted by obtaining the solution of the boundary-layer equations by a finite-difference scheme that permitted various initial conditions and assumptions for transport properties. The program was used primarily to evaluate the several models suggested for the mixing region of the far wake. Detailed measured initial profiles were used to march downstream after assuming some form of the transport properties. The profiles obtained from the computer were compared to the experimental profiles. The results indicate that the eddy viscosity that best correlates the experimental results is based on the product of the wake half-radius and the mass flux at the centerline. A modification of this law by an introduction of intermittency arguments yielded somewhat better results. The experimental and theoretical results suggest that the wake undergoes slower mixing in the near region than was previously predicted. (Author)
AD-656 161 Not available from CFSTI.

RESTRICTED VARIATIONAL PRINCIPLE METHOD FOR THE FREE MOLECULAR MIXING OF PARALLEL STREAMS,
Aerospace Corp El Segundo Calif Labs Div
C. R. Ortloff. Jun 67, 20p Rept no. TR-1001 (2240-20)-17
SSD-TR-67-97
Contract AF 04 (695)-1001

Descriptors: (*Superaerodynamics, *Jet mixing flow), (*Hypersonic flow, Jet mixing flow), Partial differential equations, Gas flow, Optimization, Density, Velocity.
Identifiers: Variational theory.

Rosen's restricted variational principle representation of the Boltzmann equation is used to determine the free molecular mixing of two initially parallel gas streams of differing temperature and speed ratio. Mixing is accomplished by means of thermal and convective motions of the gas particles. It is shown that the variational method leads to a rapid calculation scheme for number density and velocity; results of the method compare closely to exact special function solutions of the collisionless Boltzmann equation. (Author)
AD-656 337 HC$3.00 MF$0.65

PROCEEDINGS OF THE INTERNATIONAL CONGRESS ON RHEOLOGY (4th). PART I, HELD AT BROWN UNIVERSITY, PROVIDENCE, RHODE ISLAND, AUGUST 26-30, 1963,
Brown Univ Providence R I
E. H. Lee, and Alfred L. Copley. Aug 63, 372p
Includes N67-14462-N67-14480. See also AD-656 356.
Availability: Published in Copyrighted Journal.

Descriptors: (*Rheology, Symposia), Glass, Viscosity, Polymers, Blood circulation, Energy conversion, Molecules, Crystals, Cytoplasm, Viscoelasticity, Solutions, Fluid flow, Mechanical properties, Magnetohydrodynamics.
Identifiers: Mechanochemistry, Non-Newtonian fluids.

Contents: Rheology of inorganic glasses; The deformation process and structure of crystalline polymers; Some flow properties of blood; Mechanochemistry; Plastic deformation and imperfections in crystals (Summary of Lecture); Rheology of cytoplasmic streaming; Non-Newtonian intrinsic viscosity of polymer solutions; Some fundamental aspects of polymer extrusion; Viscoelastic behavior of crystalline polymers; Normal stress measurements on polymer solutions; Some non-Newtonian effects in flow through tubes; Anisotropic mecanique et geometrique des milieux pulverulents; Some secondary flow phenomena in general viscoelastic fluids; Second-order stresses in the flow of gases; Stress relaxation in high polymers and metals; Material relaxation and structural damping; Viscoelastic relaxation in liquids and polymers; Stability of flow of a non-Newtonian liquid between two rotating cylinders in the presence of a circular magnetic field.
AD-656 355 Not available from CFSTI.

PROCEEDINGS OF THE INTERNATIONAL CONGRESS ON RHEOLOGY (4th). PART II, HELD AT BROWN UNIVERSITY, PROVIDENCE, RHODE ISLAND, AUGUST 26-30, 1963,
Brown Univ Providence R I
E. H. Lee. Aug 63, 683p
Includes N67-14482-N67-14519. See also AD-656 355 and AD-656 357.
Availability: Published in Copyrighted Journal.

Descriptors: (*Rheology, Symposia), Continuum mechanics, Viscoelasticity, Test methods, Stresses, Strain (Mechanics), Birefringence, Metals, Glass, Polymers, Fluids, Colloids.

Conference papers are presented in the general areas of continuum mechanics, testing techniques, stress and strain distribution analysis, birefringence, metals, technology, polymers, polymer fluids, glasses, and dispersions.
AD-656 356 Not available from CFSTI.

PROCEEDINGS OF THE INTERNATIONAL CONGRESS ON RHEOLOGY (4th), PART III, HELD AT BROWN UNIVERSITY, PROVIDENCE, RHODE ISLAND, AUGUST 26-30, 1963,
Brown Univ Providence R I
E. H. Lee. Aug 63, 610p
Includes N67-14521-N67-14555. See also AD-656 356.
Availability: Published in Copyrighted Journal.

Descriptors: (*Rheology, Symposia), Continuum mechanics, Viscoelasticity, Test methods, Stresses, Strain (Mechanics), Metals, Glass, Polymers, Fluids, Solids, Colloids.

Conference papers are presented in the general areas of continuum theory, testing techniques, stress and strain distribution analysis, metals, technology, polymers, polymer fluids and solids, glasses, and dispersions.
AD-656 357 Not available from CFSTI.

A METHOD OF CALCULATING QUASI TWO-DIMENSIONAL FLOWS THROUGH CASCADES,
California Inst of Tech Pasadena Hydrodynamics Lab
Ramani Mani. Jul 67, 48p Rept no. E-79.10
Contract Nonr-220 (59)

Descriptors: (*Axial-flow compressors, Two-dimensional flow), Cascade structures, Gas flow, Airfoils, Mathematical analysis, Computer programs.

Details are given of a procedure to compute the effect of varying axial velocity on the cascade performance of an axial flow compressor blade row. The relevant equations and the procedure of solution are given. Details are given of a computing program to carry out the calculations. The program is written in Fortran IV and is in three parts. Data cards giving details of the flow geometry have to be punched for the first part only. (Author)
AD-656 428 HC$3.00 MF$0.65

FLUID FREE SURFACE PROXIMITY EFFECT ON A SPHERE VERTICALLY ACCELERATED FROM REST.
Final technical rept.,
California Inst of Tech Pasadena Hydrodynamics Lab
John G. Waugh, and Albert T. Ellis. Jun 67, 36p
Rept no. E-124.2
Contract N600 (19)59368

Descriptors: (*Spheres, *Fluid mechanics), Surface properties, Boundary layer, Acceleration, Gravity, Drag.

Theory is developed to estimate the effect of free surface proximity on the initial added mass of a sphere accelerated vertically upward from rest in an ideal fluid. It is assumed that the acceleration regime is sufficiently brief that inertial forces predominate and gravitational effects may be neglected. Results of tests in water indicate that while there are slight viscous and gravitational effects over the acceleration regime, the agreement between theory and experiment is good. It is concluded that over briefer acceleration regimes these effects would decrease and the agreement would improve. (Author)
AD-656 429 HC 3.00 MF$0.65

NUMERICAL SOLUTION OF THE TURBULENT-BOUNDARY-LAYER EQUATIONS,
Douglas Aircraft Co Inc Long Beach Calif Aircraft Div
A. M. O. Smith, and T. Cebeci. 29 May 67, 146p
Rept no. DAC-33735
Contract NOw-66-0324

Descriptors: (*Turbulent boundary layer, Numerical analysis), Compressible flow, Vortices, Viscosity, Equations, Momentum, Flat plate models, Heat transfer, Prandtl number.

The report presents a numerical solution of turbulent boundary-layer equations for both compressible and incompressible flows. An eddy viscosity concept is used to eliminate the Reynolds shear-stress term, and an eddy-conductivity concept is used to eliminate the time mean of the product of fluctuating velocity and temperature. The turbulent boundary layer is regarded as a composite layer consisting of inner and outer regions, and a separate expression for eddy viscosity is used in each region. The ratio of eddy-viscosity to eddy conductivity is assumed to be constant. An implicit finite-difference method is used in the solution of both momentum and energy equations after they are linearized. (Author)
AD-656 430 HC$3.00 MF$0.65

SPECIFIC VOLUMES OF WATER AT HIGH PRESSURES OBTAINED FROM ULTRASONIC-PROPAGATION MEASUREMENTS.
Harvard Univ Cambridge Mass Lyman Lab of Physics
For primary bibliographic entry see Field 7D.
AD-656 440 HC$3.00 MF$0.65

AIR LIQUEFACTION BOUNDARIES EXPERIMENTALLY DETERMINED FOR THE BALLISTIC RESEARCH LABORATORIES' SUPERSONIC AND HYPERSONIC WIND TUNNELS,
Ballistic Research Labs Aberdeen Proving Ground Md
Maurice A. Sylvester. Jun 67, 44p Rept no. BRL-1367

Descriptors: (*Liquefied gases, *Gas flow), Supersonic wind tunnels, Hypersonic wind tunnels, Hypersonic characteristics, Pressure, Temperature, Stagnation point, Air.

The boundaries for the onset of air liquefaction were experimentally determined. These boundaries indicate the regions where the liquefaction of air constituents has an effect on the flow properties in the test section. The boundaries were determined by making static and total head pressure measurements (with varying temperature) throughout the appropriate Mach and Reynolds number ranges of both the supersonic and hypersonic wind tunnels. The results show that air liquefaction occurs near the theoretical boundary (Clausius-Clapeyron) for Mach numbers 4.75 and 5.00 with little, if any, supersaturation. However, as the Mach number increases to 6.0, 7.5 and 9.2, there is an increase in the amount of supersaturation before liquefaction occurs, and at a given Mach number, the difference between the experimental and theoretical temperature at the onset of liquefaction is about the same at all pressure levels tested. These results may allow a relaxation of our stagnation temperature requirements by an amount which would be of considerable operational significance at M = 9.2. (Author)
AD-656 445 HC$3.00 MF$0.65

AN INTERFEROMETRIC STUDY OF THE EFFECTS OF CORONA DISCHARGE ON THE TEMPERATURE PROFILES ON A FLAT, UNIFORM TEMPERATURE PLATE IN FORCED CONVECTION.
Technical rept.,
Ohio State Univ Research Foundation Columbus
Richard D. Godfrey, and Henry R. Velkoff. Jun 67, 131p Rept no. TR-4
AROD-4942:5-E
Contract DA-31-124-ARO (D)-246

Descriptors: (*Fluid mechanics, *Convection (Heat transfer)), (*Interferometers, *Electrical corona), Boundary layer, Ionization, Velocity, Temperature, Electric fields, Stability, Tests, Refraction, Errors, Tables.

The purpose of this thesis was to study the effects of corona discharge on flow past a flat plate at zero incidence. In a previous exploratory investigation into the effects of ionization on the gas in channel flow, interesting results were observed. Pressure drops and heat transfer coefficients were found to double. The velocity profile was distorted. In an attempt to explain the phenomenon, Velkoff hypothesized an induced electric field component in opposition to the flow. An analytical solution for laminar flow with a uniform charge density in the boundary layer was developed by extending the Rossow solution for MHD flows. The corona effect was predicted to retard the flow and thicken the boundary layer. An experimental program was initiated to study this phenomenon by observing changes in the temperature profiles on a flat, uniform temperature plate in forced convection with a Mach-Zender interferometer. A series of tests were run with a constant plate to ambient temperature difference but different free stream velocities and corona currents. At a 62.5 foot per second free stream velocity, a 1000 microns ampere corona current did not effect the flow. At lower velocities, the effects observed were opposite to those predicted. It was found that the boundary layer was turbulent at the 62.5 foot per second test. Also it was noted that 5.9 foot per second test with corona discharge was similar to the 62.5 foot per second test. The body force hypothesized by Velkoff does not appear to describe the corona effect. A possible mechanism that would account for the observed result is that the corona discharge induces an instability in the flow. (Author)
AD-656 466 HC$3.00 MF$0.65

THE SUBSONIC WIND TUNNEL OF BATTELLE COLUMBUS LABORATORIES.
Battelle Memorial Inst Columbus Ohio Columbus Labs
For primary bibliographic entry see Field 14B.
AD-656 486 HC$3.00 MF$0.65

TRANSIENT FREE-SURFACE FLOW.
Final rept. Sep 65-Apr 67,
Stanford Research Inst Menlo Park Calif
Clarence M. Ablow, and Vladimir M. Lieskovsky. Apr 67, 50p
Contract Nonr-5061 (00)

Descriptors: (*Flow fields, Fluids), Coanda effect, Reynolds number, Stability, Fluid amplifiers, Theory, Velocity, Surface properties, Hydraulic systems.

The theoretical analysis of two-dimensional, transient, free surface, irrotational flows of a perfect, incompressible fluid has been reduced to a routine determination of terms in series. The method has been applied to find the switching speed of a simple model of a hydraulic switch based on the Coanda effect. Experiments with the model showed that the low Reynolds number needed for stability makes perfect fluid theory inapplicable. (Author)
AD-656 489 HC$3.00 MF$0.65

INVESTIGATION OF ABLATION EFFECTS ON HYPERSONIC DYNAMIC STABILITY OF A 10 DEG. CONE.
Final rept. Jun 65-Nov 66,
LTV Aerospace Corp Dallas Tex LTV Vought Aeronautics Div
Dave R. Moore, Charles J. Stalmach, Jr., and Thomas C. Pope. Jan 67, 71p
AFFDL-TR-66-230
Contract AF 33 (615)-2902

Descriptors: (*Reentry vehicles, *Dynamics), (*Hypersonic wind tunnels, *Ablation), Hypersonic characteristics, Stability, Wind tunnels, Velocity, Nitrogen, Thermal properties, Aerodynamic characteristics, Vacuum, Reynolds number, Motion, Gas flow, Pressure, Measurement, Boundary layer.

An experimental program has been conducted in the LTV Hypervelocity Wind Tunnel at M = 17 to investigate the effects of ablation product characteristics and thermal lags on re-entry vehicle dynamic stability. The free oscillation method of dynamic stability measurement was used and the ablation processes were simulated by the controlled mass injection through four sections of the porous model skin. The flow rates through the top and bottom quadrants were oscillated at the same frequency and at an amplitude proportional to the model motion. The thermal lag effect was investigated with nitrogen injection into nitrogen tunnel flow at several different mass flow rates and phase angles between the oscillating mass flow and the body motion. The ablation product study was conducted by injecting gases other than nitrogen with specific heat ratio and molecular weight being the test parameters in addition to mass flow rate. The results obtained from these tests indicate significant effect on dynamic stability with both injection phase angle and some characteristics of the injected gas. The effects of model frequency, Reynolds number and mass injection distribution were also investigated and some static pressure measurements were made near the aft of the model. Appendices to the report contain tabulations of the pertinent data and discussions of supporting analytical studies and data analysis. (Author)
AD-656 492 HC$3.00 MF$0.65

BURNETT EQUATIONS AND SHOCK STRUCTURE.
Research rept.,
Polytechnic Inst of Brooklyn N Y Dept of Aeros-

pace Engineering and Applied Mechanics
Prem K. Khosla. May 67, 34p
PIBAL-988
Contract Nonr-839 (34)

Descriptors: (*Shock waves, Differential equations), Integral equations, Partial differential equations, Stresses, Heat, Mathematical models.

The Chapman-Enskog expansion for the solution of the Boltzmann equation was re-examined and certain inconsistencies in the procedure were pointed out. For a steady state one-dimensional Boltzmann equation, the expansion is modified with the help of the PLK method. Macroscopic equations up to Burnett level of approximation are then obtained. Finally, these equations are used to examine the structure of a shock wave in a gas consisting of Maxwellian molecules. It is shown that new Burnett equations give solutions for all values of Mach number. (Author)
AD-656 575 HC$3.00 MF$0.65

A STUDY OF THE MEAN AND TURBULENT STRUCTURE OF A FREE JET AND JET IMPINGEMENT HEAT TRANSFER.
Technical rept.,
Aeronautical Research Associates of Princeton Inc N J
Coleman duP. Donaldson, Richard S. Snedeker, and David P. Margolis. Dec 66, 86p Rept no. ARAP-96
Contract Nonr-3903 (00), ARPA Order-149-60
Rept. on Hypervelocity Kill Mechanisms Program.

Descriptors: (*Jets, *Heat transfer), (*Turbulence, Jets), Stagnation point, Reynolds number, Fluid flow.
Identifiers: Jet impingement.

The results of an experimental study of the heat transfer below normally impinging jets are presented. These results are correlated on the basis of the local mean flow and turbulent characteristics of the free jet that would exist in the plane of impingement were this plane to be removed. In order to make these local correlations possible, a rather extensive survey of the turbulent characteristics of the free jet used in the experiments is made that can be used in connection with previous studies of the local mean character of the jet. On the basis of the method of local correlations which is developed, a rationale for computing heat transfer distributions below impinging jets is suggested. (Author)
AD-656 592 HC$3.00 MF$0.65

MAYER'S THEORY OF CONDENSATION AND HOMOGENEOUS NUCLEATION,
Yale Univ New Haven Conn Dept of Engineering and Applied Science
For primary bibliographic entry see Field 20M.
AD-656 640 HC$3.00 MF$0.65

ROTATIONAL STAGNATION-POINT FLOW,
Cornell Univ Ithaca N Y
R. C. Roger, and G. S. S. Ludford. 7 Oct 66, 24p
AROD-5329:5
Contract DA-31-124-ARO (D)-325
Availability: Published in Journal of Mathematics and Mechanics v16 n12 p1339-60 Jun 1967.

Descriptors: (*Vortices, *Stagnation point), Three-dimensional flow, Equations, Velocity, Functions, Surface properties.

Hayes' exact linear solution for a three-dimensional stagnation point is found to miss essential features. It appears that higher-degree terms in the velocity influence the inviscid solution decisively; although Hayes' classification 0 < or = alpha sub zero < 1, alpha sub zero = 1, alpha sub zero > 1 (excluded), on the basis of his parameter alpha sub zero, is still valid. A scheme is given for determining the solution correct to any order in distance form the stagnation point. For subquadratic approximation it involves terms of all degrees in the velocity components less than 4/ (1 - alpha sub zero). The influence of surface curvature and the special case alpha sub zero = 1 (which is left unresolved) are also considered. (Author)
AD-656 664 Not available from CFSTI.

THE RESPONSE OF A CYLINDRICAL STRUCTURE TO A TURBULENT FLOW FIELD AT SUBCRITICAL REYNOLDS NUMBER,
Toronto Univ (Ontario) Inst for Aerospace Studies
A. C. Campbell, and B. Etkin. Jul 67, 60p Rept no. UTIAS-TN-115

Descriptors: (*Slender bodies, *Gust loads), (*Cylindrical bodies, *Aeroelasticity), Turbulence, Reynolds number, Bending, Moments, Model tests, Antennas, Structures, Canada.

A wind tunnel study was made of the bending moment response of a cylindrical structure exposed to a turbulent wind. A theory, developed by Etkin, of the response of a slender structure in the stream direction to a turbulent wind was compared with the experimental results. The structure used for the study was an approximate aeroelastic model of an existing radio antennas. A turbulence field was generated in the wind tunnel by a square mesh grid. With a ratio of longitudinal turbulence scale to model diameter of L/D = 21 and an intensity of 20% the model in this turbulence field was then representative of a full scale structure in atmospheric turbulence. Bending moment spectra in the drag and lift directions were obtained for various turbulence conditions. It was found that close agreement was obtained between theory and experimental results in the turbulence field. This indicates that the drag coefficient for this cylinder is very similar under turbulent and steady wind conditions. Some measurements of lift-drag correlation were also made which indicated that essentially zero correlation exists in the turbulent field. It was concluded that the theory provides a reasonably accurate method of predicting the response of a slender structure to a turbulent wind. (Author)
AD-656 689 HC$3.00 MF$0.65

AN APPROXIMATE SOLUTION OF THE BOUNDARY LAYER EQUATIONS USING THE METHOD OF PARAMETRIC DIFFERENTIATION,
Massachusetts Inst of Tech Cambridge Fluid Dynamics Research Lab
David C. Ives. Jun 67, 139p Rept no. T67-1
AFOSR-67-1512
Contract AF 49 (638)-1622

Descriptors: (*Laminar boundary layer, Differential equations), Approximation (Mathematics), Two-dimensional flow, Incompressible flow, Partial differential equations, Integral equations, Shear stresses, Walls.

A study was made of the boundary layer problem, using the method of parametric differentiation. The boundary layer flow is assumed to be laminar, steady, two-dimensional, and incompressible, with no heat transfer, suction or blowing. Two methods of parametric differentiation were utilized: the first varied the outer inviscid flow; while the second varied the velocity slip at the wall. The method of parametric differentiation is well suited to solve the non-linear boundary layer equations. A related linear partial differential equation, coupled with a first order ordinary non-linear differential equation, is produced by the application of this method. A formal higher approximation procedure was developed to accurately solve the ensuing linear partial differential equation, replacing the 'local solution' approximation used heretofore. This higher approximation procedure is couched in terms which allow the application of asymptotic methods. The result of this analysis is an integral equation describing the rate of change of the velocity field with respect to a parameter. (Author)
AD-656 693 HC$3.00 MF$0.65

ON THE DETERMINATION OF THE THICKNESS OF THE BAROCLINIC LAYER OF THE SEA,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 8C.
AD-656 698 HC$3.00 MF$0.65

MASSIVE BLOWING EXPERIMENTS,
Aerospace Corp El Segundo Calif Labs Div
Jerry F. Bott. Jun 67, 41p Rept no. TR-1001 (2240-20)-18
SSD-TR-67-108
Contract AF 04 (695)-1001

Descriptors: (*Wedges, Gas flow), (*Gas flow, Injection), Supersonic flow, Mass transfer, Boundary layer, Angle of attack, Flow separation, Shock waves, Flow separation, Flow visualization, Chemiluminescence.
Identifiers: Blowing.

A massively blowing wedge was studied in a supersonic arc tunnel. The shock wave and separation streamline were visualized in the low density flow by two chemiluminescent techniques. The data obtained under a variety of conditions were found to be correlated by a linear relation between two nondimensional blowing parameters. The two parameters were derived both by dimensional analysis and by an approximate momentum balance analysis. The relation between the blowing parameters found for the wedge also seems to hold for a blowing cone when the three-dimensional geometry is taken into account. (Author)
AD-656 705 HC$3.00 MF$0.65

CONDENSATION IN A RAPIDLY EXPANDING METAL VAPOR-INERT GAS MIXTURE,
Michigan Univ Ann Arbor Dept of Aerospace Engineering
For primary bibliographic entry see Field 20M.
AD-656 708 HC$3.00 MF$0.65

SHOCK WAVE TRANSMISSION THROUGH A LARGE RESTRICTION IN A CONSTANT AREA DUCT.
Memorandum rept.,
Ballistic Research Labs Aberdeen Proving Ground Md
Brian P. Bertrand. Jun 67, 41p Rept no. BRL-MR-1848

Descriptors: (*Shock waves, Wave transmission), (*Ducts, Wave transmission), Pressure, Orifices, Ventilation ducts, Shock tubes, Attenuation, Underground structures.

Plane shock waves were reflected by bulkheads in a constant area, circular cross-section, shock tube. Each bulkhead contained a centered circular orifice; tube-to-orifice area ratios were 96, 50.5 and 23.3. Both input- and transmitted-shock pressure histories were measured at several distances from the bulkhead, and the results are compared with theory. Pressure measurements were also made of the shock waves transmitted through orifices in two bulkheads placed in series. (Author)
AD-656 744 HC$3.00 MF$0.65

VISCOUS TRANSONIC SPIRAL AND RADIAL FLOW,
Michigan Univ Ann Arbor Gas Dynamics Labs
M. Sichel, and Y. K. Yin. Jul 67, 27p Rept no. 07146-2-T
AROD-3537:4-E
Contract DA-31-124-ARO (D)-276

Descriptors: (*Vortices, *Transonic flow), Viscosity, Two-dimensional flow, Equations, Partial differential equations.

Similarity solutions of the viscous transonic equation describing source, and source vortex flows were found. These solutions contain shock like transitions from the supersonic to the subsonic branch of the corresponding inviscid solutions, while the singularity near the sonic point of the inviscid solutions is shifted to a smaller radius. It is shown that this similarity solution is identical to the transonic viscous compressible source and sink flow solutions of Wu (1955) and Sakurai (1958). (Author)
AD-656 749 HC$3.00 MF$0.65

STATIC AND DYNAMIC INSTABILITIES OF A PROPELLANT LINE.
Massachusetts Inst of Tech Cambridge Aeroelastic and Structures Research Lab
Alan S. Greenwald, and John Dugundji. May 67, 64p Rept no. ASRL-TR-134-3
AFOSR-67-1395
Contract AF 49 (638)-1528

Descriptors: (*Pipes, Stability), (*Flutter, Pipes), Damping, Viscoelasticity, Propellants, Fluid dynamic properties, Cantilever beams, Statics.

The static and dynamic instabilities of cantilever propellant lines with flowing fluid are investigated experimentally and theoretically. Experimentally, three different cantilever propellant lines were tested. Above a critical fluid velocity, flutter was observed in the form of traveling waves moving down the line. Static divergence was also observed at lower fluid velocities when the free end of the cantilever was pinned. Movies were taken exhibiting clearly the onset of flutter and divergence. Theoretically, two and four mode Galerkin solutions with different types of structural damping forces were obtained. Theory confirmed previous investigators' observations of sharp changes in flutter behavior at certain values of mass ratio and significant effects on stability caused by the type of structural damping present. Reasonably good agreement was found between the experimental flutter and divergence phenomena, and the theory. Using these and previous investigators' results, design curves are presented allowing quick estimates of the static and dynamic instability of such propellant lines. (Author)
AD-656 752 HC$3.00 MF$0.65

HIGH VELOCITY RADIATING FLOWS.
General Electric Co Philadelphia Pa Missile and Space Div
For primary bibliographic entry see Field 20M.
AD-656 766 HC$3.00 MF$0.65

NONEQUILIBRIUM RADIATION AND IONIZATION IN SHOCK WAVES,
Purdue Univ Lafayette Ind School of Aeronautics Astronautics and Engineering Sciences
Clair E. Chapin. Jun 67, 134p Rept no. AA/ES-67-9
Contracts N00014-67-A-0226-0001, NAS8-11485

Descriptors: (*Shock waves, Emissivity), (*Gas ionization, Shock waves), Plasma medium, Propagation, Interactions, Argon, Photochemistry, Recombination reactions, Atomic energy levels, Perturbation theory, Iterations, Chemical equilibrium.

Radiation energy transfer and ionization rates in the mixture of atoms, ions and electrons produced by a normal shock wave propagating in cold argon gas are examined. It is shown the gas may be regarded as a combination of two gases, one composed only of electrons and one composed of both atoms and ions. Temperature differences between the electron gas and the atom-ion gas significantly affect radiation and ionization rates in the shock wave. The analysis uses the ionization rates due to both atom-atom collisions and electron-atom collisions. In addition, photoionization, which is responsible for precursor ionization, is included. (Author)
AD-656 767 HC$3.00 MF$0.65

TRANSITION TO TURBULENCE FOR SUBMERGED INCOMPRESSIBLE AND FREE COMPRESSIBLE FLUID JETS.
Rept. for 1 Jun 66-31 May 67,
Martin Co Orlando Fla
C. P. McKensie, and W. P. Dorsey. Jun 67, 60p Rept no. OR-8882
AFOSR-67-1894
Contract AF 49 (638)-1725

Descriptors: (*Fluid amplifiers, Fluid flow), (*Boundary layer transition, Reynolds number), (*Jets, Boundary layer transition), Fluid flow, Incompressible flow, Compressible flow, Nozzle gas flow, Turbulence.

Experimental data are presented which verify the least Reynolds number at which transient disturbances are amplified and transition to turbulence occurs. The least critical Reynolds number data shows good agreement with stability analysis predictions performed by Curle. The observations reported were obtained from jets formed by supply nozzles with aspect ratios of 1. The range of aspect ratios was limited around unity because the results are then directly applicable to microminature fluid amplifiers. In addition to critical Reynolds number determination, data are presented that gives the distance at which transition to turbulence occurs for several typical geometries. (Author)
AD-656 780 HC$3.00 MF$0.65

APPLICATION OF QUASILINEARIZATION TO THE SOLUTION OF NON-LINEAR DIFFERENTIAL EQUATIONS.
Kansas State Univ Manhattan
For primary bibliographic entry see Field 12A.
AD-656 782 HC$3.00 MF$0.65

FINITE WIDTH EFFECTS ON THE SELF ACTING FOIL BEARING.
Columbia Univ., New York. Lubrication Research Lab.
For primary bibliographic entry see Field 13I.
AD-802 009 HC$3.00 MF$0.65

PLANE SHOCK WAVES IN METALS AND HETEROGENEOUS MATERIALS.
Picatinny Arsenal, Dover, N. J. Feltman Research Labs.
For primary bibliographic entry see Field 20K.
AD-811 215 HC$3.00 MF$0.65

A CRITICAL REVIEW OF DATA ON HEAT TRANSFER AND PRESSURE DISTRIBUTION ON NOSE CONES IN THE HIGH UNIT REYNOLDS NUMBER REGIME,
Battelle Memorial Inst., Columbus, Ohio. Columbus Labs.
G. R. Whitacre, and E. W. Ungar. May 67, 71p RSIC-653
Contract DA-01-021-AMC-14593 (Z)

Descriptors: (*Nose cones, Aerodynamic characteristics), State-of-the-art reviews, Conical bodies, Cylindrical bodies, Flared afterbodies, Supersonic characteristics, Hypersonic characteristics, Heat transfer, Pressure, Load distribution, Boundary layer transition, Turbulent boundary layer, Flow separation, Blunt bodies, Experimental data, Tables, Free flight models, Wind tunnel models, Reynolds number, Test facilities, Low altitude.

The report presents the results of a state-of-the-art study on pressure and heat-transfer distributions on axisymmetric bodies in the high Reynolds number per foot regime. The Mach number range covered is generally from 3.5 to 9 corresponding to the flight envelope of the Army Missile Command low-altitude/high-velocity experiment (LAHIVE). In addition to a summary of previous flight and wind-tunnel data, areas of controversy and unexplained or anomalous results are pointed out in which LAHIVE data will be of great value. A brief survey is presented of Government-owned wind tunnels, ranges, and shock tunnels pertinent to the LAHIVE flight regime. Recommendations on instrumentations are included, particularly for the cone-cylinder-flare vehicles, on the data analysis and correlation of results, and on further applications of LAHIVE vehicles.
AD-815 017 HC$3.00 MF$0.65

THREE-COMPONENT MEASUREMENTS ON RECTANGULAR WINGS WITH CAVITATION FINAL REPORT.
Max-planck-institut Fur Stromungsforschung, Gottingen (West Germany).
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 18.
N67-31504 HC$3.00 MF$0.65

SIDESLIP CHARACTERISTICS AT VARIOUS ANGLES OF ATTACK FOR SEVERAL HYPERSONIC MISSILE CONFIGURATIONS WITH CANARD CONTROLS AT A MACH NUMBER OF 2.01.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 16D.
For abstract, see STAR 05 18.
N67-31533 HC$3.00 MF$0.65

TABULATED DATA FROM A PRESSURE-DISTRIBUTION INVESTIGATION AT MACH NUMBER 2.01 OF THE WING OF A CANARD AIRPLANE MODEL.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 18.
N67-31534 HC$3.00 MF$0.65

AN INVESTIGATION OF SUPERSONIC STORE INTERFERENCE IN THE VICINITY OF A 22 DEG SWEPT WING FUSELAGE CONFIGURATION AT MACH NUMBERS OF 1.61 AND 2.01.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 18.
N67-31546 HC$3.00 MF$0.65

SINGLE STAGE EXPERIMENTAL EVALUATION OF VARIABLE GEOMETRY GUIDE VANES AND STATORS. PART II - ANNULAR CASCADE INVESTIGATIONS OF CANDIDATE VARIABLE GEOMETRY DESIGNS.
Pratt and Whitney Aircraft, West Palm Beach, Fla. Florida Research and Development Center.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 18.
N67-31727 HC$3.00 MF$0.65

THE EFFECT OF TRAILING-EDGE CONTROL DEFLECTION ON THE LOADING OVER A 60 DEG DELTA-WING-BODY COMBINATION.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 18.
N67-31739 HC$3.00 MF$0.65

INJECTION OF A DRAG-REDUCING FLUID INTO TURBULENT PIPE FLOW OF A NEWTONIAN FLUID.
LTV Aerospace Corp., Dallas, Tex. Research Center.
J. Spangler, and C. S. Wells, Jr., Jul 67, 21p

NASA-CR-852, REPT.-0-71000/7R-4
Contract NASW-729

Descriptors: *Drag reduction, *Fluid mechanics, *Newtonian fluid, *Pipeflow, Drag, Fluid, Injection, Mechanics, Reduction, Shear, Stress, Turbulent, Wall.

For abstract, see STAR 05 18.
N67-31795 HC$3.00 MF$0.65

THE LAMINAR BOUNDARY LAYER IN A RADIATING ABSORBING GAS NEAR A FLAT PLATE.
National Aeronautics and Space Administration, Washington, D. C.
For primary bibliographic entry see Field 20M.
For abstract, see STAR 05 18.
N67-31858 HC$3.00 MF$0.65

REPORT OF THE SESSION OF THE WGLR SUBCOMMITTEE ON AERODYNAMICAL COMPUTER TECHNOLOGY.
Wissenschaftliche Gesellschaft Fur Luft- Und Raumfahrt, Cologne (West Germany).
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 18.
N67-31881 HC$3.00 MF$0.65

REPORT ON THE SESSION OF THE WGLR SUBCOMMITTEE ON FLIGHT CONTROL.
Wissenschaftliche Gesellschaft Fur Luft- Und Raumfahrt, Cologne (West Germany).
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 18.
N67-31956 HC$3.00 MF$0.65

FLOW OF A VISCOUS FLUID BETWEEN FIXED AND BLOWN ROTATING DISKS.
Techeniya Vyazkoy Zhidkosti Mezhdu Nepodvizhnym I Obduvayemym Vrashchayushchimisya Diskami
Scientific Translation Service, La Canada, Calif.
L. A. Dorfman. May 67, 9p NASA-TT-F-10931
Contract NASW-1496
Transl. Into English From Izv. Akad. Nauk Sssr, Mekhan. Zhidkosti I Gaza, (Moscow), No. 2, Mar.-apr. 1966 P 86-91

Descriptors: *Incompressible fluid, *Rotating disk, *Viscous flow, Disk, Equation, Fixed, Flow, Fluid, Incompressible, Navier-stokes equation, Rotation, Stress, Velocity, Viscous.

For abstract, see STAR 05 18.
N67-32113 HC$3.00 MF$0.65

EXPERIMENTAL INVESTIGATION OF THE TRANSONIC FLUTTER OF SIMPLE THIN TRUNCATED-CONE PANELS.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
J. Gilman, Jr. Oct 61, 36p NASA-TM-X-599

Descriptors: *Cone, *Panel flutter, *Transonic speed, Differential, Flutter, Panel, Pressure, Speed, Thin, Transonic.

For abstract, see STAR 05 18.
N67-32137 HC$3.00 MF$0.65

LARGE-SCALE LOW-SPEED WIND-TUNNEL TESTS OF A DELTA WINGED SUPERSONIC TRANSPORT MODEL TO DETERMINE AERODYNAMIC EFFECTS OF FORWARD OR REVERSE THRUST.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
For primary bibliographic entry see Field 1C.
For abstract, see STAR 05 18.
N67-32141 HC$3.00 MF$0.65

AERODYNAMIC CHARACTERISTICS OF A TAILLESS FIXED-WING SUPERSONIC TRANSPORT MODEL AT MACH NUMBERS FROM 1.80 TO 2.86.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1C.
For abstract, see STAR 05 18.
N67-32143 HC$3.00 MF$0.65

AERODYNAMIC CHARACTERISTICS OF A THREE-ENGINE SUPERSONIC TRANSPORT MODEL HAVING A LOW- ASPECT-RATIO VARIABLE-SWEEP WARPED WING.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1C.
For abstract, see STAR 05 18.
N67-32144 HC$3.00 MF$0.65

EFFECT OF WING PIVOT LOCATION ON LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF A VARIABLE SWEEP WING HAVING AN M PLANFORM.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1C.
For abstract, see STAR 05 18.
N67-32145 HC$3.00 MF$0.65

MEASUREMENTS OF FLOW PROPERTIES IN THE VICINITY OF THREE WING-FUSELAGE COMBINATIONS AT MACH NUMBERS OF 1.61 AND 2.01.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 18.
N67-32309 HC$3.00 MF$0.65

LAMINAR FLOWS IN POROUS ELASTIC CHANNELS.
Case Inst. of Tech., Cleveland, Ohio. Engineering Div.
E. F. Grabowski, and S. Ostrach. Jun 67, 127p
NASA-CR-86983, FTAS-TR-67-17
Contract NGR-36-003-088

Descriptors: *Channel flow, *Laminar flow, *Viscous fluid, Axial, Blood, Channel, Elastic, Flow, Fluid, Inertia, Kidney, Laminar, Porosity, Pressure, Reynolds number, Viscous, Wall.

For abstract, see STAR 05 18.
N67-32329 HC$3.00 MF$0.65

20E. Masers and Lasers

SINGLE-BEAM-LASER ROTATION-RATE SENSOR,
Polytechnic Inst of Brooklyn N Y Dept of Electrophysics
Paul Fenster, and Walter K. Kahn. 26 Sep 66, 3p
AFOSR-67-1791
Contract AF 49 (638)-1402
Availability: Published in Electronics Letters v2 n10 p380 Oct 1966.

Descriptors: (*Lasers, Rotation), (*Sensors, Lasers), Helium, Neon, Audiofrequency, Detection, Sensitivity, Mirrors, Noise.

An audio frequency proportional to the rotation rate of a re-entrant laser-cavity or -ring system has been derived from a single output beam of such a system. Experiments were carried out with a He-Ne laser at 6328A. The output-signal amplitude falls rapidly with increasing audio frequency. The locking frequency is lower than that for conventional dual-beam arrangements. (Author)
AD-655 979 Not available from CFSTI.

INVESTIGATION OF THE MECHANISMS ASSOCIATED WITH GAS BREAKDOWN UNDER INTENSE OPTICAL ILLUMINATION.
United Aircraft Corp East Hartford Conn Research Labs
For primary bibliographic entry see Field 20I.
AD-656 084 HC$3.00 MF$0.65

TUNABLE SPONTANEOUS PARAMETRIC GENERATION OF VISIBLE LIGHT IN ADP.
Technical rept.,
Cornell Univ Ithaca N Y Materials Science Center
Douglas Magde, and Herbert Mahr. 6 Jul 67, 38p
Rept no. TR-15, MSC-718
Contract Nonr-401 (47)
Availability: Published in Physical Review.

Descriptors: (*Coherent radiation, *Parametric amplifiers), Photons, Spectra (Infrared), Spectra (Visible + ultraviolet), Lasers, Optical properties, Mathematical analysis, Polarization.
Identifiers: Ammonium dihydrogen phosphate.

A detailed experimental study was made in ADP of low gain, single passage parametric interaction. Pumped by a pulsed laser source at 3472A, the parametric output was tunable from 4400A to 16000A. The experimental results agree well with a theory which considers the process as the amplification of quantum noise and which involves explicitly a calculation of the noise input under the present experimental conditions. (Author)
AD-656 093 Not available from CFSTI.

COMPLEX REPRESENTATION OF OPTICAL FIELDS IN COHERENCE THEORY,
Rochester Univ N Y Dept of Physics and Astronomy
For primary bibliographic entry see Field 20F.
AD-656 209 Not available from CFSTI.

EFFECTIVE OPERATOR FORMALISM IN OPTICAL PUMPING,
Columbia Radiation Lab New York
For primary bibliographic entry see Field 20F.
AD-656 474 Not available from CFSTI.

LASER FOG DISDROMETER SYSTEM.
Final rept. 16 Sep 63-30 Apr 67,
Technical Operations Inc Burlington Mass
John Ward. 30 Jun 67, 68p Rept no. TO-B-67-32
AFCRL-67-0399
Contract AF 19 (628)-3813
Availability: Published in Various Journals.

Descriptors: (*Lasers, Fog), (*Instrumentation, Fog), Q meters, Aerosols, Ruby, Solar spectrum, Airborne, Illumination, Diffraction, Motion, Sampling, Resolution, Images, Coherent radiation, Exposure meters.

Instrumentation to record and size naturally occurring fog droplets in the 5 microns to 100 microns diameter size range has been constructed and used in the field. The system is based on a two-step imaging technique using Fraunhofer holograms. A Q-switched ruby laser illuminates the sample volume and forms the holograms on aerial film. The short time pulse of the laser stops the motion of the droplets and provides 'instantaneous' sampling periodically over the history of a fog. The Fraunhofer hologram technique allows both sufficient resolution as well as considerable depth of field to record the data. A readout instrument was also fabricated; this instrument counts and sizes the fog data by reconstructing, from the hologram frames recorded in the field, real images of the sample volume. (Author)
AD-656 487 Not available from CFSTI.

Group 20E—Masers and lasers

SOLID STATE RESEARCH, 1967-2.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 20L.
AD-656 548 HC$3.00 MF$0.65

INFLUENCE OF CHARGE COMPENSATION ON UV-EXCITATION OF RARE-EARTH FLUORESCENCE,
Harry Diamond Labs Washington D C
For primary bibliographic entry see Field 20L.
AD-656 599 HC$3.00 MF$0.65

RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Columbia Radiation Lab New York
For primary bibliographic entry see Field 9C.
AD-656 618 HC$3.00 MF$0.65

STUDY OF CROSS RELAXATION AND GLASS LASER AMPLIFIERS.
Final rept. 1 Nov 65-31 Jul 67,
Electro-Optical Systems Inc Pasadena Calif
George L. Clark. 31 Jul 67, 41p Rept no. EOS-7020-Final
Contract N00014-66-C-0021

Descriptors: (*Lasers, *Atomic energy levels), Glass, Neodymium, Garnet, Gain, Excitation, Relaxation time, Line spectrum, Fluorescence, Absorption, Probability.

Spectral hole burning and cross-relaxation in neodymium-doped glass were investigated to determine whether stored energy can be removed rapidly by a spectrally narrow driving signal. By measuring the fluorescence from a pumped sample of glass before and after the passage of the signal pulse as a function of signal energy, quantitative estimates of cross-relaxation time and cross section for stimulated emission are made. (Author)
AD-656 763 HC$3.00 MF$0.65

INVESTIGATION OF ELECTRON BEAM PROCESSING OF ALUMINUM OXIDE AND RELATED MATERIALS.
Materials Research Corp Orangeburg N Y
For primary bibliographic entry see Field 11B.
AD-656 769 HC$3.00 MF$0.65

INVESTIGATION OF THE POTENTIALITIES OF PHOTOCHEMICAL LASER SYSTEMS. PART I - SURVEY AND ANALYSIS FINAL REPORT, 1 FEB. 1966 - 31 JAN. 1967.
Hughes Research Labs., Malibu, Calif.
C. R. Giuliano, L. D. Hess, and J. D. Margerum.
31 Jan 67, 152p NASA-CR-85005
Contract NAS12-94

Descriptors: *Laser, *Light absorption, *Monochromatic radiation, *Photodissociation, *Solar radiation, *Spectroscopy, Absorption, Bromide, Coherent, Conversion, Dioxide, Emission, Excitation, Gas, Iodide, Light, Mechanism, Monochromatic, Nitrogen, Photochemistry, Pumping, Radiation, Solar.

For abstract, see STAR 05 18.
N67-31658 HC$3.00 MF$0.65

STUDY OF CW GASEOUS LASERS FOR SPACE COMMUNICATIONS SEMIANNUAL STATUS REPORT, 1 JUL. - 30 NOV. 1966.
Rochester Univ., N. Y. Dept. of Electrical Engineering.
H. Gamo, and T. Tako. 1 Dec 66, 13p NASA-CR-83577, SASR-2
Contract NGR-33-019-048

Descriptors: *Continuous wave, *Gas laser, *Space communication, *Vacuum system, *Xenon, Amplifier, Atmospheric, Beam, Cascade, Communication, Continuous, Frequency, Gas, Helium, High power, Ion, Laser, Lifetime, Line, Low pressure, Micron, Oscillation, Pumping, Space, Stability, System, Testing, Transition, Ultrahigh, Vacuum, Wave, Window.

For abstract, see STAR 05 18.
N67-31738 HC$3.00 MF$0.65

MEASUREMENT OF ATMOSPHERIC AEROSOLS BY POLARIZED-LASER LIGHT SCATTERING.
Technical rept.,
Utah Univ., Salt Lake City. Microwave Device and Physical Electronics Lab.
Roger W. Call, E. Paul Palmer, and Richard W. Grow. Jun 67, 138p NSF-11, UTEC-MD-67-034
Grant NSF-GP-874

Descriptors: (*Lasers, *Aerosols), Light, Backscattering, Atmosphere, Rayleigh scattering, Measurement, Polarization, Intensity, Particle size, Attenuation, Equations, Voltage, Response, Measurement.

A new method of taking aerosol measurements using scattered light from a laser beam fired into the atmosphere is developed and tested. The method developed uses measurements of light scattered from a polarized laser beam to find the aerosol attenuation coefficient, the aerosol number density and the aerosol size distribution. The method was tested by making measurements from a secondary site distant from the laser transmitter. Results are plotted for attenuation coefficients up to 30 kilometers in altitude. Theory is developed for making two-station backscatter measurements using a pulsed ruby laser as a light source. The Rayleigh and Mie scattering functions are applied to the geometry of the problem, and by considering the polarized properties of the laser beam a simplified scattering equation is developed. (Author)
PB-175 688 HC$3.00 MF$0.65

20F. Optics

THE THEORY AND PHYSICAL CONSTRAINTS OF AN ELECTRO-OPTICAL SIGNAL PROCESSOR FOR PHASED ARRAY ANTENNAS,
Columbia Univ., New York. Electronics Research Labs.
For primary bibliographic entry see Field 9E.
AD-446 299 HC$3.00

TWO-PHOTON ABSORPTION SPECTRUM OF CdS,
Rochester Univ N Y Inst of Optics
For primary bibliographic entry see Field 20L.
AD-655 971 Not available from CFSTI.

MEASUREMENT OF PARALLEL (SOLLER) SLITS WITH A MODIFIED WEISSENBERG GONIOMETER.
Philips Labs Briarcliff Manor N Y
For primary bibliographic entry see Field 7D.
AD-655 984 Not available from CFSTI.

OPTICAL PROPERTIES OF ALPHA-MnS.
California Univ Riverside
For primary bibliographic entry see Field 20L.
AD-656 000 Not available from CFSTI.

TUNABLE SPONTANEOUS PARAMETRIC GENERATION OF VISIBLE LIGHT IN ADP.
Cornell Univ Ithaca N Y Materials Science Center
For primary bibliographic entry see Field 20E.
AD-656 093 Not available from CFSTI.

AN IMAGE RESTORATION EXPERIMENT ON TURBULENCE-DEGRADED IMAGES,
Scripps Institution of Oceanography San Diego Calif Visibility Lab
For primary bibliographic entry see Field 14E.
AD-656 124 HC$3.00 MF$0.65

COMPLEX REPRESENTATION OF OPTICAL FIELDS IN COHERENCE THEORY,
Rochester Univ N Y Dept of Physics and Astronomy
L. Mandel. 22 Dec 66, 8p
AFOSR-67-1731
Contract AF 49 (638)-1532
Availability: Published in Journal of Optical Society of America v57 n5 p613-7 May 1967.

Descriptors: (*Coherent radiation, Electromagnetic fields), Operators (Mathematics), Integral transforms, Mathematical analysis, Light, Random variables.

The problem of making an envelope representation of the fluctuating classical wave amplitude of a stationary optical field is investigated. The condition that the envelope function fluctuates as slowly as possible, in a least-squares sense, is shown to lead naturally to the complex analytic signal representation first introduced by Gabor. Besides being in correspondence with the quantum-mechanical description of the optical field, this representation is the only one in accord with intuitive notions about the envelope of a random process. (Author)
AD-656 209 Not available from CFSTI.

ON TRANSITION FUNCTIONS OCCURRING IN THE THEORY OF DIFFRACTION IN INHOMOGENEOUS MEDIA,
Polytechnic Inst of Brooklyn N Y Dept of Electrophysics
L. Levey, and L. B. Felson. 16 Sep 66, 25p
AFOSR-67-1734
Contract AF 49 (638)-1402
Availability: Published in Journal of Inst. Maths. Applics. v3 p76-97 1967.

Descriptors: (*Diffraction, *Electric fields), Illumination, Refractive index, Integrals, Green's function, Boundary value problems, Integral transforms, Wave transmission, Mathematical analysis, Optical properties.
Identifiers: Geometric optics.

The geometric-optical shadow zone formed by a line source illuminating an opaque plane in a plane stratified medium with a monotonically increasing refractive index may be bounded by a compound curve. Forming the curve are the caustic of the refracted rays and a segment of the ray that is tangent to the opaque plane. A representation is developed for the highfrequency fields in the region of confluence of the component curves of the shadow boundary. Within this region are localized many of the characteristic features of the high frequency fields in the medium, e.g. reflected, refracted and diffracted rays and caustic and glancing ray transitions. It is shown how the representation derived assumes the proper forms descriptive of these features as the field point varies within the region. Some of the properties of an 'incomplete Airy integral' that appears as a canonical function in the representation are also considered. (Author)
AD-656 217 Not available from CFSTI.

EFFECTIVE OPERATOR FORMALISM IN OPTICAL PUMPING,
Columbia Radiation Lab New York
W. Happer, and B. S. Mathur. Jun 67, 55p
Contract DA-28-043-AMC-00099 (E)
Availability: Submitted for publication in Physical Review 55p nd.

Descriptors: (*Pumping (Optical), Atomic energy levels), (*Absorption spectrum, Monochromatic

light), Hamiltonian, Light, Operators (Mathematics), Modulation, Wave functions, Alkali metals, Electric fields, Dielectric properties.

Real and virtual absorption of weak monochromatic light is analyzed with semiclassical radiation theory. The influence of the light on the atoms is described by an effective ground-state Hamiltonian operator and the effect of the atoms on the light is described by a dielectric susceptibility operator. These operators are expressed explicitly in terms of familiar ground-state observables, angular factors, oscillator strengths, and plasma dispersion functions. The theory gives a comprehensive description of optical pumping, light shifts, and light modulation due to real and virtual absorption of light, and several new effects are predicted. Repopulation of the atomic ground state from a polarized excited state is not considered in this paper. (Author)
AD-656 474 Not available from CFSTI.

DETERMINATION OF THE POCKELS ELECTRO-OPTIC COEFFICIENT IN ADP AT 5.5GHz,
Polytechnic Inst of Brooklyn Farmingdale N Y Dept of Electrophysics
L. Silverstein, and M. Sucher. 3 Nov 66, 4p
AFOSR-67-1800
Contract AF 49 (638)-1402
Availability: Published in Electronics Letters v2 n12 2p Dec 1966.

Descriptors: (*Electrooptics, Measurement), Microwaves, Single crystals, Electric fields, Coherent radiation, Lasers, Light transmission, Dielectric properties, Optical properties.
Identifiers: Pockel's effect, Ammonium dihydrogen phosphate.

A method is described for determining the Pockels coefficient r (subscript 63) of an electro-optic crystal simply by identifying and measuring the peak r.f. power that maximises or minimises the time-average transmitted-light intensity when the crystal is used to intensity-modulate light via the longitudinal electro-optic effect. Results are given for ADP at 5.5 GHz. The effect of modulator-cavity-endplate perforations is discussed. (Author)
AD-656 558 Not available from CFSTI.

THE EFFECT OF PRESSURE ON OPTICAL ABSORPTION, RECOMBINATION RADIATION, AND RESISTIVITY OF GaSb.
Harvard Univ Cambridge Mass Div of Engineering and Applied Physics
For primary bibliographic entry see Field 20L.
AD-656 590 HC$3.00 MF$0.65

THE OPTICAL ABSORPTION EDGE IN THE LEAD SALTS AND ITS VARIATION WITH TEMPERATURE AND PRESSURE.
Harvard Univ Cambridge Mass Div of Engineering and Applied Physics
For primary bibliographic entry see Field 20L.
AD-656 591 HC$3.00 MF$0.65

SPECULAR REFLECTION AND CHARACTERISTICS OF REFLECTED LIGHT,
Army Missile Command Redstone Arsenal Ala
Herbert B. Holl. 29 Sep 66, 11p Rept no. RE-TR-67-7
Availability: Published in Journal of the Optical Society of America v57 n5 p683-90 May 1967.

Descriptors: (*Reflectivity, Numerical analysis), (*Refractive index, Tables), Electromagnetic waves, Dielectric properties, Optical properties, Polarization, Solids, Light, Graphics.
Identifiers: Brewster angles, Fresnel equations.

This paper concerns tables of Fresnel intensity reflectances which resulted from studies based on classical electrodynamics. The tables contain approximately 2500 indices of refraction N = n - ki; i.e., n = 0.1 (0.1)4.0, k = 0 (0.1)6.0 for angles of incidence theta sub zero = 0 degrees (5 degrees)85 degrees. Series of graphs illustrate the solutions of the Fresnel equations. The supplementary discussion describes in detail the occurrence of reflection characteristics for which (a) the amplitude of the wave oscillating parallel to the plane of incidence is a minimum, (b) the degree of polarization is a maximum, and (c) the two amplitudes of the reflected wave have a 90 degrees difference of phase. The numerical solutions are also presented in graphs that provide means, in addition to those already in general use, of determining the indices of refraction of solid materials. (Author)
AD-656 670 Not available from CFSTI.

ELECTROLUMINESCENCE: AN APPRAISAL FOR AVIONIC DISPLAY APPLICATIONS.
Technical memo.,
Litton Systems Inc Woodland Hills Calif Guidance Systems Lab
D. J. Pizzicara. 10 Feb 66, 55p Rept no. TM-66-49, Pub-4730
Contract Nonr-4951 (00)
Availability: Published in J. Soc. for Information Display Apr 1966.

Descriptors: (*Display systems, *Electroluminescence), (*Aircraft equipment, Display systems), Phosphorescent materials, Manufacturing methods, Experimental design, Resolution, Life expectancy, Visibility, Brightness, Input-output devices, Data processing systems, Switching circuits, Data storage systems, State-of-the-art reviews.

This work reviews, with respect to Electroluminescent (EL) airborne displays, the following topics: fabrication techniques; phosphors; panel design parameters; alternative solutions for storage requirements; and addressing and drive problems. Elements requiring further research are delineated. This document concludes with a system description of a thin-film EL panel (10 inches by 10 inches) including associated data buffer, drive circuitry, and interface electronics as well as estimates of size, weight and power. (Author)
AD-656 733 Not available from CFSTI.

20G. Particle Accelerators

RADIATION LEVELS AT THE LOS ALAMOS TANDEM ACCELERATOR FACILITY,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 15.
LA-3641 HC$3.00 MF$0.65

PEGRAM NUCLEAR PHYSICS LABORATORIES PROGRESS REPORT, JANUARY 1966-JANUARY 1967.
Columbia Univ., New York. Dept. of Physics.
For primary bibliographic entry see Field 18B.
For abstract, see NSA 21 15.
NYO-GEN-132 HC$3.00 MF$0.65

REPORT PRESENTED AT INTERNATIONAL SYMPOSIUM ON ELECTRON AND POSITRON STORAGE RINGS, PART II.
Comitato Nazionale Per L Energia Nucleare, Frascati (Italy). Laboratori Nazionali Di Frascati.
15 Nov 66, 38p LNF-66/56
Symposium Held in Saclay, France, Sep. 1966
Its Nota Interna 337

Descriptors: *Boson, *Conference, *Electron, *Positron annihilation, Angular, Annihilation, Apparatus, Chamber, Collision, Counter, Cross section, Distribution, International, Kaon, Measurement, Muon, Pion, Positron, Production, Reaction, Ring, Spark, Storage.

For abstract, see STAR 05 18.
N67-31961 HC$3.00 MF$0.65

20H. Particle Physics

LIMITATIONS OF PION POLE DOMINANCE,
Cambridge Univ (England) Dept of Applied Mathematics and Theoretical Physics
B. Renner. May 67, 6p
AFOSR-67-1652
Grant AF-EOAR-36-65

Descriptors: (*Pions, Nuclear scattering), (*Meson scattering, Moments), Algebras, Decay schemes, Vector analysis, Great Britain.

An examination was made of the vertex of the electromagnetic current and an axial current divergence between <pi (+) (p)/and the vacuum, approximated by a pion pole. The results indicate that pion pole dominance cannot be used without limitations.
AD-655 877 HC$3.00 MF$0.65

WEINBERG SUM RULES AND SCALAR MESONS,
Cambridge Univ (England) Dept of Applied Mathematics and Theoretical Physics
S. P. de Alwis. Jun 67, 12p
AFOSR-67-1630
Grant AF-EOAR-36-65

Descriptors: (*Mesons, Groups (Mathematics)), (*Decay schemes, Mesons), Vector analysis, Algebras, K mesons, Nuclear resonance, Great Britain.
Identifiers: Scalar mesons, Sum rules, Symmetry (Quantum mechanics), Rho mesons.

A generalization was made of the Weinberg sum rules to SU (3) x SU (3) by including scalar meson states and it was found that the second sum rule or at least its saturation with low lying-resonances is not consistent with experimental data. Hence instead the experimental decay widths of Rho and K* are used together with the first sum rule to obtain predictions for the decays widths of a proposed scalar meson. (Author)
AD-655 879 HC$3.00 MF$0.65

SIMPLIFIED MODEL FOR A THREE-PARTICLE REGGE TRAJECTORY,
Cambridge Univ (England) Dept of Applied Mathematics and Theoretical Physics
Ian T. Drummond. 19 Sep 66, 11p
AFOSR-67-1735
Grant AF-EOAR-36-65
Availability: Published in The Physical Review v155 n5 p1749-57 Mar 25 1967.

Descriptors: (*Decay schemes, Regge poles), (*Particle trajectories, Regge poles), (*Regge poles, Mathematical models), Interactions, Nuclear resonance, Elastic scattering, Field theory, Pions, Meson reactions, Integrals, Great Britain.
Identifiers: Rho mesons.

Final-state-interaction theory is generalized to the case of a Reggeon (that is, a particle with mass-dependent spin) which decays into three particles, any two of which can undergo a resonant S-wave interaction. It is shown that the residue functions which describe the coupling of the Reggeon to the three-particle state can be used to calculate the corresponding contribution to the imaginary part of the trajectory function. This contribution is not guaranteed to be positive. The formula also predicts the correct unstable two-particle discontinuity associated with the particle-resonance configuration of the final state. (Author)
AD-655 880 Not available from CFSTI.

REGGEIZATION OF INVARIANT AMPLITUDES,

Imperial Coll of Science and Technology London (England) Dept of Physics
H. F. Jones, and M. D. Scadron. Jul 67, 20p
AFOSR-67-1643
Grant AF-EOAR-12-67
Prepared in cooperation with International Centre for Theoretical Physics, Trieste (Italy), ICTP/67/28

Descriptors: (*Nuclear scattering, Regge poles), (*Particle trajectories, *Regge poles), Pions, Nucleons, Nuclear isobars, Dispersion relations, Integrals, Nuclear spins, Great Britain, Italy.

The method of Reggeizing invariant amplitudes which uses the form of elementary particle exchange as a guide is revived. This is made possible by the fact that, for any given external particles, the form of spin J exchange has been derived in a usable form. Consideration is given to the use of isobar expansion as a guide to Reggeization and to the continuation of the Regge form below threshold by means of a dispersion integral. The necessity or no of daughter trajectories and applications to superconvergence are discussed.
AD-655 883 HC$3.00 MF$0.65

COVARIANT PROPAGATORS AND VERTEX FUNCTIONS FOR ANY SPIN,
Imperial Coll of Science and Technology London (England) Dept of Physics
Michael Scadron. May 67, 33p
AFOSR-67-1609
Grant AF-EOAR-12-67
Prepared in cooperation with International Centre for Theoretical Physics, Trieste (Italy), ICTP/67/23.

Descriptors: (*Nuclear spins, *Wave functions), (*Bosons, Nuclear spins), (*Fermions, Nuclear spins), (*Photons, Nuclear spins), Tensor analysis, Momentum, Special functions (Mathematical), Momentum, Nuclear scattering, Nuclear cross sections, Decay schemes, Nuclear isobars, Regge poles, Great Britain, Italy.
Identifiers: Vertex functions.

High spin wave function, propagators and vertex functions are developed in a covariant on-shell manner. General formulae are given for massive bosons and fermions and for photons. Application to dispersion theory is discussed. (Author)
AD-655 886 HC$3.00 MF$0.65

CERTAIN COLLISIONS BETWEEN PROTONS AND DIATOMIC MOLECULES.
Final scientific rept., 15 Mar 65-31 May 67,
Physical Studies Inc Reno Nev
R. G. Breene, Jr. 31 May 67, 64p Rept no. PSI-67-10
AFCRL-67-0352
Contract AF 19 (628)-5174

Descriptors: (*Diatomic molecules, Proton bombardment), (*Nitrogen, Proton bombardment), (*Proton reactions, Diatomic molecules), Proton cross sections, Wave functions, Iteration, Gas ionization, Dissociation, Excitation, Electron bombardment, Molecular energy levels, Integrals.

The general description of proton-homonuclear diatomic molecule collisions is formulated in impact parameter language. A solution of the resulting Schroedinger equations through the second iteration is used for the ab initio calculation of the proton-nitrogen charge exchange cross section. The agreement with experiment is essentially exact although this may be fortuitous. The first iterative solution is used to compute the nitrogen-proton dissociative charge exchange cross section. The poor agreement with experiment could apparently be much improved by the consideration of translational energy exchange. The proton excitation of the Schumann-Runge system is considered in the tracking approximation. The agreement with Green is better than would have been expected. A crude classical explanation of the temperature effect near threshold in nitrogen-electron ionizing collisions is suggested. (Author)
AD-655 911 HC$3.00 MF$0.65

THE STABILITY OF CONTINUALLY CREATED MASS AGAINST GRAVITATIONAL DECAY,
Cornell Univ Ithaca N Y Center for Radiophysics and Space Research
Richard L. Liboff. Jun 67, 11p Rept no. CRSR-277

Descriptors: (*Mass-energy relation, Relativity theory), Astrophysics, Density, Gravity, Field theory.

In the steady state universe of Bondi and Gold, matter is continuously created at the rate of 10 to the -46th power gms/cc sec. Hoyle is able to come to a similar conclusion by modifying the field equations of general relativity. Both theories yield an expanding universe in which the density of matter remains constant. In the former theory matter is not conserved. More generally, in Hoyle's formulation, the stress-energy tensor is no longer divergenceless, and again energy (mass) is not conserved. These theories yield a local creation of mass which in turn raises the question of the consistency of such theories with the principle of causality. In this paper we take the point of view that the 'static' field which accompanies such a mass is initiated with the creation of that mass and propagates away from it with the speed of light. It is presumed that the mass is the source of the propagating field energy. These causality and conservation of energy (viz. the particle is born in an environment in which energy is conserved) statements give rise to a self consistent integral equation for the mass. Notwithstanding some objections the investigation is nevertheless consistent with the continuous creation hypothesis originally formulated by Bondi and Gold.
AD-655 918 HC$3.00 MF$0.65

DERIVATION OF MASS SPECTRUM AND MAGNETIC MOMENTS FROM CURRENT CONSERVATION IN RELATIVISTIC 0 (3,1) AND 0 (4,2) - THEORIES,
Colorado Univ Boulder Dept of Physics
A. O. Barut, Dennis Corrigan, and Hagen Kleinert. 1967, 30p
AFOSR-67-1746
Grant AF-AFOSR-30-65
Prepared for publication in Colorado Univ., Boulder. Inst. for Theoretical Physics Publications, Jun 1967.

Descriptors: (*Elementary particles, Groups (Mathematics)), Mass spectrum, Magnetic moments, Nuclear resonance, Invariance, Vector analysis, Operators (Mathematics), Wave functions.
Identifiers: Current algebras, Hadrons.

It is shown that in the framework of the noncompact dynamical group theory, for every choice of the current operator in the representation space, the requirements of current conservation and universality of charge determine the relativistic mass spectrum. The most general current linear in the algebra and linear in the momenta are investigated and mass spectra of the form $m = C(j + 1/2)$, in 0 (3,1), and of the form $m = Cn$, or $m = Cn((1 + a/(n\ sq.))$ to the 1/2 power in 0 (4,2) are derived with positive magnetic moments and with form factors in agreement with experiment. The freedom in the choice of current, minimal or nonminimal, is discussed and compared with that which exists in the usual Langrangian field theory. (Author)
AD-655 926 HC$3.00 MF$0.65

FINAL SCIENTIFIC REPORT ON AF-AFOSR-159-64, OCTOBER 1, 1964-SEPTEMBER 30, 1966,
Mcmaster Univ Hamilton (Ontario)
Henry E. Duckworth. Jul 67, 4p
AFOSR-67-1715
Grant AF-AFOSR-159-64

Descriptors: (*Nuclear cross sections, Atomic properties), Nuclear shell models, Ion beams, Nuclear binding energy, Canada.

Neutron binding energies in the region N=82 and N=126 were studied by mass spectroscopic techniques. A new second-order double focussing mass spectrometer was constructed. The charge states of low energy atoms emerging from thin films were investigated. These studies are very briefly summarized, and a list of resulting publications is included.
AD-655 927 HC$3.00 MF$0.65

STRUCTURE OF THE 'ETA MESON TO 3 PION' AMPLITUDE,
Maryland Univ College Park Dept of Physics and Astronomy
Ching-Hung Woo. 7 Dec 66, 7p
AFOSR-67-1748
Grant AF-AFOSR-500-66
Availability: Published in The Physical Review v156 n5 p1719-23 Apr 25 1967.

Descriptors: (*Meson reactions, Decay schemes), (*Decay schemes, Theory), Pions, Nuclear spins, Invariance, Particle trajectories, Statistical distributions.
Identifiers: Branching ratios, C-invariance, Eta mesons.

Difficulties with the usual phenomenological theory of the C-conserving part of 'eta meson to 3 pion' decay, with the absolute value of the increment of I = 1 and dominance by the nearly constant symmetric amplitude, are summarized. It is discussed why the difficulties are indicative of the presence of a significant asymmetric part in the amplitude. An attempt is made to find the possible reductions in the theoretical branching ratio R=Gamma (eta to 3 neutral pions)/Gamma (eta to positive pion + negative pion + neutral pion as a result of including some large asymmetric parts. It was found that a branching ratio of the order R approx. 1.1 is the lower limit of what can be reasonably achieved in these theories. If the experimental value should turn out to be R approx. = 0.5, it will be extremely difficult to reconcile with the theory even when large energy variations in the decay amplitude are allowed for; and it is nearly certain that a part with the absolute value of the increment of $I > 2$ is present in 'eta to 3 pion' in that case. (Author)
AD-655 947 Not available from CFSTI.

EFFECTS OF PRESSURE ON THE TRANSPORT OF IONS THROUGH ROTATING HELIUM II,
Chicago Univ Ill Dept of Physics
B. E. Springett. 8 Sep 66, 14p
AFOSR-67-1739
Grants AF-AFOSR-785-65, NSF-GP-5302
Availability: Published in The Physical Review v155 n1 p139-50 Mar 5 1967.

Descriptors: (*Liquefied gases, Transport properties), (*Helium, Superfluidity), (*Superfluidity, Vortices), Ion bombardment, Pressure, Temperature, Interactions, Probability.

Describes measurements of the cross section for capture of negative ions by vortex lines in He II and of the mobility of the negative ion, as a function of both pressure and temperature. Certain null results on positive ions are also presented. (Author)
AD-655 948 Not available from CFSTI.

ELASTIC SCATTERING OF NEUTRONS FROM O AND Ar AT 14.0 MeV.
Doctoral thesis,
Ohio Univ Athens Dept of Physics
P. L. Beach, Roger W. Finlay, R. L. Cassola, and

R. D. Koshel. 16 Nov 66, 8p
AFOSR-67-1760
Grant AF-AFOSR-854-65
Research supported in part by NSF.
Availability: Published in Physical Review v156 n4 p1201-6 Apr 20 1967.

Descriptors: (*Neutron scattering, Differential cross section), (*Oxygen, Neutron scattering), (*Argon, Neutron scattering), Liquefied gases, Nuclear models, Potential theory, Background, Elastic scattering, Nuclear spins, Atomic orbitals.
Identifiers: Nuclear optical models.

Differential cross sections of 14-MeV neutrons elastically scattered from liquid samples of oxygen and argon were measured using associated-particle time-of-flight techniques. Careful attention was given to the subtraction of background neutrons scattered from the Dewar walls. The corrected data were analyzed in terms of four- and six-parameter optical-model calculations. A possible ambiguity in the imaginary potential for oxygen is discussed. The sensitivity of the results to the parameters in the spin-orbit potential is also examined. (Author)
AD-655 953 Not available from CFSTI.

AMOUNT OF FOUR-PARTICLE PRODUCTION REQUIRED IN S-MATRIX THEORY,
Maryland Univ College Park Dept of Physics and Astronomy
A. J. Dragt. 23 Nov 66, 8p
AFOSR-67-1720
Grant AF-AFOSR-500-66
Availability: Published in The Physical Review v156 n5 p1588-93 Apr 25 1967.

Descriptors: (*Nuclear scattering, S-matrix), Elastic scattering, Elementary particles, Momentum, Nuclear cross sections.
Identifiers: Unitarity.

It is shown that a knowledge of the two-particle scattering amplitude below inelastic threshold places restrictions on the amount of four-particle production at high angular momenta. Conversely, if there is no four-particle production, there is no elastic scattering. (Author)
AD-655 972 Not available from CFSTI.

RELATIVISTIC POSITRON-ELECTRON BREMSSTRAHLUNG AT WIDE ANGLES: A NUMERICAL CALCULATION,
Stanford Univ Calif Dept of Physics
Stanley M. Swanson. 29 Sep 66, 9p
AFOSR-67-1647
Contract AF 49 (638)-1389
Research supported in part by AEC.
Availability: Published in Physical Review v154 n5 p1601-7 Feb 1967.

Descriptors: (*Bremsstrahlung, Numerical analysis), (*Electrons, Bremsstrahlung), (*Positrons, Bremsstrahlung), Gamma emission, Nuclear cross sections, Nuclear scattering, Electron beams, Continuous spectrum, Perturbation theory.

The bremsstrahlung spectrum for the process 'electron + positron yields electron + positron + gamma photon' was evaluated at photon-emission angles of roughly 30 to 120 degrees from the incident particles in the c.m. system. The phase-space integrals of the exact, lowest-order differential cross section were evaluated numerically. A computer program was used to reduce the Dirac traces to invariants and to further simplify them until reasonably compact expressions were obtained. Numerical results for selected photon angles and energies are given for 15-BeV positrons incident upon electrons at rest in the laboratory and for 600- and 4000-MeV positrons in the c.m. system (colliding-beam experiments). It was found that certain relativistic approximations to the spectrum, which are valid for forward angles, are still fairly good at wide angles; an empirical modification to such an approximation is given which provides a useful interpolation formula for the wide-angle region. (Author)
AD-655 981 Not available from CFSTI.

STOPPING CROSS SECTIONS IN BORON OF LOW ATOMIC NUMBER ATOMS WITH ENERGIES FROM 15 TO 140 keV,
Mcmaster Univ Hamilton (Ontario) Dept of Physics
James R. MacDonald, John H. Ormrod, and Henry E. Duckworth. 20 Sep 65, 8p
AFOSR-67-1756
Grant AF-AFOSR-159-64
Availability: Published in Zeitschrift fuer Naturforschung v21 n1/2 p130-4 1966.

Descriptors: (*Molecular beams, Interactions), (*Atomic orbitals, Interactions), Boron, Aluminum, Carbon, Films, Hydrogen, Helium, Probability, Canada.

The electronic stopping cross sections in boron for atomic projectiles with Z equal or less than 11 were determined in the energy interval 15 to 140 keV. Reasonable agreement is found with theory, however the previously observed periodic dependence of S-epsilon on the atomic number of the projectile is also evident. Results for the relative straggling in energy loss are reported for hydrogen projectiles in boron, carbon, and aluminum targets and for helium projectiles in boron and carbon. Theoretical straggling estimates agree reasonably well with the experimental results. (Author)
AD-655 999 Not available from CFSTI.

U (6,6) AND SUPERCONVERGENT SUM RULES FOR MESON-BARYON SCATTERING,
Imperial Coll of Science and Technology London (England) Dept of Physics
H. F. Jones, and M. D. Scadron. Jul 67, 20p
AFOSR-67-1704
Grant AF-EOAR-12-67
Prepared in cooperation with International Centre for Theoretical Physics, Trieste (Italy), ICTP/67/17.

Descriptors: (*Nuclear scattering, Mathematical prediction), (*Meson scattering, Mathematical prediction), (*Baryons, Nuclear scattering), Groups (Mathematics), Strange particles, Pions, Nucleons, Nuclear spins, Regge poles, Parity, Great Britain.
Identifiers: Sum rules, Symmetry (Quantum mechanics).

Superconvergent sum rules are derived for Pi + N* to Pi + N*, two of which agree with U (6,6) when saturated by N and N* poles in the equal mass limit. Saturation for physical masses gives gamma-N* = 84 MeV. It is pointed out that those sum rules which agree with U (6,6) for Pi + N to Pi + N* and Pi + N* to Pi + N* do so also for all analogous strange-particle reactions. The special status of these sum rules is discussed. (Author)
AD-656 001 HC$3.00 MF$0.65

THE RELATIVISTIC POSITION OPERATOR AT SUBATOMIC LEVEL,
Kent Univ Canterbury (England)
For primary bibliographic entry see Field 20J.
AD-656 006 Not available from CFSTI.

O (4) SYMMETRY AND REGGE-POLE THEORY,
California Univ Berkeley Dept of Physics
Daniel Z. Freedman, and Jiunn-Ming Wang. 20 Mar 67, 7p
AFOSR-67-1661
Grant AF-AFOSR-232-66
Availability: Published in Physical Review Letters v18 n20 p863-7 May 15 1967.

Descriptors: (*Nuclear scattering, Regge poles), (*Regge poles, Groups (Mathematics)), Particle trajectories, Nucleons, Antiparticles, Pions, Interactions, Invariance.
Identifiers: Strong interactions, Symmetry (Quantum mechanics).

For reactions in which the initial and final states in the t-channel contain equal mass particles (e.g. N + anti-N to 2 pions) of masses m and m', it is shown, using analytic continuation and Lorentz invariance, that the on-mass shell helicity amplitudes in the region t=0, (m-m')sq < or = s < or = (m + m')sq, are invariant under the group O (4). Decompositions of the amplitudes in irreducible representations of O (4) (four dimensional partial wave expansions) are obtained and related to conventional partial wave expansions. Poles classified according to the O (4) group are shown to lead to infinite families of Regge poles. The formalism is developed for arbitrary spins and the case of nucleon-nucleon scattering is studied in detail. The results for the Regge pole structure in NN scattering are stronger than those of the conspirator theory. (Author)
AD-656 024 Not available from CFSTI.

THE SCATTERING OF He3 BY He4 AND OF He4 BY TRITIUM,
California Inst of Tech Pasadena
R. J. Spiger, and T. A. Tombrello. May 67, 66p
Contract Nonr-220 (47)
Availability: Published in Unidentified Journal nd.

Descriptors: (*Helium, Elastic scattering), (*Nuclear energy levels, Helium), Particle beams, Tritium, Differential cross section, Decay schemes, Lithium, Alpha particles, Nucleons, Phase shift, Nuclear models.

The differential elastic scattering cross section was measured for the scattering of He3 from He4 and the scattering of He4 from tritium for bombarding energies of 5 to 18 MeV and 4 to 18 MeV, respectively. Data were also obtained for the reactions He4 (He3,p)Li6, He4 (He3,p')Li6*, H3 (alpha, n)Li6, and H3 (alpha, n')Li6*. Levels are seen at 4.65, 6.64, 7.47, and 9.7 MeV in Li7 and at 4.57, 6.73, 7.21, and 9.3 MeV in Be7. A phase shift analysis suggests assignments of 7/2 (-) and 5/2 (-) for the two lower levels in Li7, confirms the 5/2 (-) assignment of the 7.47 level and suggests a 7/2 (-) assignment for the new level at 9.7 MeV. Similarly in Be7, the assignments of 7/2 (-) and 5/2 (-) for the lower two levels are confirmed and an assignment of 7/2 (-) is suggested for the new level at 9.3 MeV The reduced widths tor alpha particle and nucleon emission were determined by fitting the phase shifts near each level with a single and/or double level formula from the R-matrix formalism of Lane and Thomas. The results of the analysis are discussed and compared with predictions of recent nuclear model calculations. (Author)
AD-656 034 Not available from CFSTI.

THE ENERGY DEPENDENCE OF THE FRAGMENTATION PARAMETERS AND MEAN FREE PATHS OF COSMIC RAY NUCLEI WITH Z GREATER THAN OR EQUAL TO 10 (+),
Minnesota Univ Minneapolis Cosmic Ray Group
For primary bibliographic entry see Field 4A.
AD-656 046 HC$3.00 MF$0.65

TEST OF THE DIRECT INTERACTION MODEL FOR ATOMIC REACTIONS: CORRELATION OF THE OUTGOING ELECTRONS IN ELECTRONIC IONIZATION.
New York Univ N Y Dept of Physics
For primary bibliographic entry see Field 7D.
AD-656 052 HC$3.00 MF$0.65

ODD QUEERNESSES IN THE DEFORMATION CHART,

Instituto de Investigacion Aeronautica Y Espacial Buenos Aires (Argentina) Laboratorio de Radiaciones
S. M. Abecasis, H. E. Bosch, and C. A. Heras.
10 Jan 67, 3p
Grant DA-ARO-49-092-66-G121
Availability: Published in Nuovo Cimento v48 Ser10 p152-4 Mar 11 1967.

Descriptors: (*Nuclei, Deformation), Nuclear spins, Parity, Barium, Isotopes, Nuclear models, Argentina.

Further confirmation is given to the existance of a region of deformation with 50 < Z < 82 and N approx. = Z. The work is based on a systematic treatment of available experimental data together with applications of current nuclear models.
AD-656 136 Not available from CFSTI.

SYMMETRY BREAKING IN NON-ABELIAN GAUGE THEORIES,
Imperial Coll of Science and Technology London (England) Dept of Physics
For primary bibliographic entry see Field 20J.
AD-656 144 Not available from CFSTI.

ASTROPHYSICAL PROBLEMS,
California Inst of Tech Pasadena
For primary bibliographic entry see Field 3B.
AD-656 150 Not available from CFSTI.

MASS EMPIRICS,
Harvard Univ Cambridge Mass
For primary bibliographic entry see Field 20J.
AD-656 210 Not available from CFSTI.

DECAY MODES 'ETA MESON TO POS. PION + NEG. PION + NEUT. PION + GAMMA PHOTON' AND 'ETA MESON TO NEUT. PION + 2 GAMMA PHOTONS',
Stanford Univ Calif Dept of Physics
Paul Singer. 3 Oct 66, 6p
AFOSR-67-1749
Contract AF 49 (638)-1389
Availability: Published in Physical Review v154 n5 p1592-5 Feb 25 1967.

Descriptors: (*Mesons, *Decay schemes), Meson reactions, Pions, Gamma-ray spectra, Photons, Interactions, Invariance.
Identifiers: C-invariance, Eta mesons.

Calculation was made of rates and photon-energy spectra for the decay modes (I) 'eta meson to positive pion + negative pion + neutral pion + gamma photon' and (II) 'eta meson to neutral pion + 2 gamma photons', with the aid of a new model. The relevance of decay mode (I) to the possibility of C violation in electromagnetic interactions is discussed.
AD-656 218 Not available from CFSTI.

REMARKS CONCERNING INELASTIC ELECTRON SCATTERING FROM 3He,
Stanford Univ Calif Dept of Physics
B. F. Gibson, and G. B. West. 17 Feb 67, 15p
AFOSR-67-1724
Contract AF 49 (638)-1389, Grant NSF-GP-948
Availability: Published in Nuclear Physics B1 p349-59 1967.

Descriptors: (*Helium, Inelastic scattering), (*Inelastic scattering, Electrons), Wave functions, Elastic scattering, Nucleons, Nuclear reactions, Nuclear cross sections.

Previous calculations of the two-body coincidence break-up of 3He have been reexamined in some detail with the object of reconciling an apparent inconsistency between the coincidence and integrated cross-section data. An impulse approximation in which only on-the-mass-shell intermediate nucleon states are kept is employed. Spectator nucleon effects are found to be small. The strong dependence of the cross section on the choice of three-body wave functions previously used in analyses of elastic electron scattering is investigated. The pole approximation gives a best fit to the shapes of the coincidence and integrated cross sections. However, in order that the normalizations agree, a reinterpretation of the coincidence data is proposed. (Author)
AD-656 219 Not available from CFSTI.

SATELLITE OBSERVATIONS OF PARTICLE FLUXES AND ATMOSPHERIC EMISSIONS,
Rice Univ Houston Tex Dept of Space Science
Brian J. O'Brien. 1966, 21p
Contracts Nonr-4964 (01), NAS6-1061
Prepared in cooperation with IIT Research Inst., Chicago, Ill., Physics Div.
Availability: Published in Aurora and Airglow, Proceedings of NATO Advanced Study Inst. Keele Univ., Staffordshire (England), p623-42 Aug 15-26, 1966.

Descriptors: (*Satellites (Artificial), *Charged particles), (*Magnetosphere, Symposia), Diurnal variations, Electrons, Aurorae, Magnetic fields, Protons, Light, Photometers, Energy, Atmospherics, Particle trajectories, Detectors, Measurement, Airglow, Theory.

A survey is given of satellite-borne measurements of precipitated particles (in Part I) and of atmospheric emissions of light (in Part II). In Part I the survey shows that while there are increasingly comprehensive measurements of particle precipitation, the basic dynamical causes are still unknown and indeed it is difficult to formulate a definitive experiment in this regard. It is known, however, that there is 'always' finite precipitation in the auroral zone (just as Part II shows that there is 'always' some emission of auroral light) so that the unknown source must be continuously active. The latitude and diurnal variations of electron and proton precipitation are discussed in detail. Part II summarizes the satellite-borne photometric studies, which have been thwarted by vehicle failures in eight out of twelve studies. Preliminary results of airglow studies (all as yet unpublished) are presented. Principal results have been obtained to date in auroral studies rather than in airglow. Simultaneous measurements of auroral light and the particles exciting it are discussed. Technical advantages and disadvantages of satellite-borne photometry are listed, together with promising lines of future research. (Author)
AD-656 250 Not available from CFSTI.

COMPARISON OF THE K (+) AND K (-) DECAY RATES INTO THE TAU AND K-MU2 MODES.
Technical rept.,
Princeton Univ N J Elementary Particles Lab
William T. Ford. 6 Jul 67, 145p Rept no. TR-43
Contract N00014-67-A-0151-0001
Doctoral thesis.

Descriptors: (*K mesons, *Decay schemes), Meson reactions, Pions, Invariance, Neutrinos, Instrumentation, Muons.
Identifiers: CP invariance, CPT invariance.

In an experiment at the Brookhaven AGS the decay rates of charged K mesons into the tau mode (K (+) to 2pi (+) + pi (-), K (-) to 2pi (-) + pi (+)) were measured in order to test the equality of the tau (+) and tau (-) rates. A difference between these rates would constitute a violation of CP invariance. At the same time the K (+) and K (-) decay rates into the K-mu2 mode (K (+) to mu (+) + muon-neutrino, K (-) to mu (-) + muon-nutrino) were also compared, as a test of CPT invariance. The K mesons, identified with a Cerenkov counter, were allowed to decay in flight over a well-defined region at the end of which were detectors for the charged secondaries. To detect the tau decays an array of eight triangular scintillation counters arranged in an octagon was used, with the requirement that all three pions give a count. A second bank of counters placed behind an iron absorber detected the muons from K-mu2 decays. The result for the ratio of tau (+) and tau (-) decay rates is (Gamma (+)/Gamma (-))-tau -1 = -0.0004 + 0.0021 or -0.0021, consistent with CP invariance. The absolute tau decay rate is Gamma-tau = (4.496 plus or minus 0.030) x 1000000/sec. For K-mu2 decay the result of the rate comparison is (Gamma (+)/Gamma (-))-mu2 -1 = 0.0054 plus or minus 0.0041, in agreement with zero, as predicted by CPT invariance. (Author)
AD-656 490 HC$3.00 MF$0.65

DERIVATION OF THE GENERALIZED MASTER EQUATION FOR COMPOSITE PARTICLES,
Naval Radiological Defense Lab San Francisco Calif
For primary bibliographic entry see Field 7D.
AD-656 586 HC$3.00 MF$0.65

TOTAL CROSS SECTIONS OF CALCIUM AND POTASSIUM FOR FAST NEUTRONS.
Revised ed.,
Army Nuclear Defense Lab Edgewood Arsenal Md
E. G. Bacon, Jr., and C. J. Wickstrom. 3 Oct 66, 9p Rept no. NDL-SP-17
Revision of manuscript submitted 2 Jun 66.
Availability: Published in Nuclear Science and Engineering v28 p293-5 1967.

Descriptors: (*Calcium, Neutron cross sections), (*Potassium, Neutron cross sections), (*Neutron cross sections, Measurement), Fast neutrons, Neutron reactions, Deuterium, Tritium, Deuteron bombardment.

Total neutron cross sections for calcium and potassium have been measured using the transmission method. Monoenergetic neutrons were produced by the D (d,n)3He and T (d,n)4He reactions using a 750-keV Cockcroft-Walton accelerator. Measurements for each were made at 7 neutron energies between 2.37 and 16 MeV. The measured total neutron cross sections range from 3.53 to 2.06 b for Ca and from 3.23 to 1.98 b for K.
AD-656 644 Not available from CFSTI.

CHARGED BOSON GAS AT HIGH DENSITY,
California Univ San Diego La Jolla Inst for Radiation Physics and Aerodynamics
Keith A. Brueckner. 31 Oct 66, 7p
AROD-5133:61
Contract DA-31-124-ARO (D)-257, ARPA Order-0570
Availability: Published in The Physical Review v156 n1 p204-6 Apr 5 1967.

Descriptors: (*Bosons, *Nuclear energy levels), Quantum statistics, Ground state, Hamiltonian, Wave functions, Perturbation theory, Diagrams.
Identifiers: Defender project.

The ground-state energy of a charged boson gas at high density is evaluated exactly to second order in the density expansion, making use of complete sums of one- and two-ring diagrams. The result agrees numerically with Feenberg's variational calculation of the energy, although the methods appear to be substantially different. The presence of logarithmic terms in the energy, which are absent in the exact result, is shown to be a result of truncation of the Hamiltonian in the pair approximation or of inadequacies of variational wave functions which omit interpair correlations. (Author)
AD-656 660 Not available from CFSTI.

AN EXPERIMENTAL STUDY OF THE (He3,dp) REACTION,
Illinois Univ Urbana Dept of Physics
R. A. Hoffswell, D. Jamnik, T. M. Noweir, and A. I. Yavin. Aug 67, 13p
Contract N00014-67-A-03005-0005

Descriptors: (*Zirconium, Ion bombardment), (*Helium, Nuclear reactions), Deuterons, Nuclear spectroscopy, Protons, Decay schemes, Carbon, Oxygen.

Results are presented of an experimental study of a sequential reaction on Zr90 of the type: Za + He3 to (Z + 1)A + 1 + d; (Z + 1)A + 1 to ZA + unstable-p. Data based on brief (He3, d unstable-p) experiments on Zr91 and Zr92 as well as C12 and O16 are also discussed.
AD-656 735 HC$3.00 MF$0.65

DYNAMICAL THEORY OF BARYONS AND LEPTONS,
Miami Univ Coral Gables Fla Center for Theoretical Studies
Behram Kursunoglu. Jul 67, 50p Rept no. CTS-HE-67-4
Grant AF-AFOSR-1268-67

Descriptors: (*Baryons, Field theory), (*Leptons, Field theory), Mass spectrum, Wave functions, Groups (Mathematics), Matrix algebra, Neutrinos, Nuclear spins.

The paper is an attempt for a dynamical description of baryons and leptons by the same wave equation yielding different mass spectra for each one of them. By using a classical nonlinear (Born-Infeld type) Lagrangian depending on the field variables E and H, a wave equation for spin 1/2 and 3/2 particles is derived. In this approach the field itself is treated as a wave function and therefore a way is found to get rid of Born type square root. The wave equation involves, besides Dirac matrices, the 15 six-dimensional generators of the group SU (3,1). It is invariant under G = SL (2,C) X SU (3,1) X L transformations, where the semi-direct product contains the Lorentz group. The wave equation yields the following results: (1) mass spectra for leptons and baryons in the form of singlets and doublets, (2) a third neutrino along with a third neutral lepton, in addition to electron and muon, are predicted, (3) difficulties of negative probabilities usually associated with half integral higher spin theories do not arise. (Author)
AD-656 753 HC$3.00 MF$0.65

X-RAY SCATTERING BIBLIOGRAPHY.
Rept. for 1 Sep 66-31 Aug 67,
Kaman Nuclear Colorado Springs Colo
William J. Veigele. 30 Jun 67, 76p Rept no. KN-738-67-2 (R)
Contract N00014-67-C-0154

Descriptors: (*X rays, Scattering), Bibliographies, Incoherent scattering, Coherent scattering, Photons, Interactions, Probability, X-ray diffraction analysis, X-ray spectroscopy, Crystallography.

The document contains a bibliography of experimental and theoretical papers on incoherent and coherent scattering of x rays. Entries are cross indexed for theoretical and experimental papers, and all entries are verified in Science Abstracts, Mathematical Reviews, or Nuclear Science Abstracts to facilitate obtaining listed papers or interlibrary loan. (Author)
AD-656 759 HC$3.00 MF$0.65

FAST NEUTRON SCATTERING FROM THE 182, 184, AND 186 ISOTOPES OF TUNGSTEN,
Argonne National Lab., Ill.
D. Lister, A. B. Smith, and C. Dunford. Jan 67, 32p
Contract W-31-109-eng-38
Prepared in cooperation with Atomics International, Canogo, Calif.

Descriptors: (*Radioactive isotopes, *Tungsten), (*Fast neutrons, Neutron scattering), Nuclear particles, Elastic scattering, Inelastic scattering, Nuclear energy, Neutron cross sections.

For abstract, see NSA 21 15.
ANL-7288 HC$3.00 MF$0.65

BROOKHAVEN NATIONAL LABORATORY ANNUAL REPORT JULY 1, 1966.
Associated Universities, Inc., New York.
For primary bibliographic entry see Field 18I.
BNL-994 (AS-20) HC$3.00 MF$0.65

ISOSHLD-II CODE REVISION TO INCLUDE CALCULATION OF DOSE RATE FROM SHIELDED BREMSSTRAHLUNG SOURCES,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 7E.
For abstract, see NSA 21 15.
BNWL-236-Suppl-1 HC$3.00 MF$0.65

THE 233 U FISSION AND CAPTURE CROSS SECTIONS AND THEIR ANALYSIS AT LOW ENERGIES,
Los Alamos Scientific Lab., N. Mex.
Delmar W. Bergen. Dec 66, 76p
Contract W-7405-eng-36

Descriptors: (*Uranium compounds, *Fission), (*Nuclear energy, *Nuclear reactions), Nuclear cross sections.

For abstract, see NSA 21 15.
LA-3676 HC$3.00 MF$0.65

PEGRAM NUCLEAR PHYSICS LABORATORIES PROGRESS REPORT, JANUARY 1966-JANUARY 1967.
Columbia Univ., New York. Dept. of Physics.
For primary bibliographic entry see Field 18B.
For abstract, see NSA 21 15.
NYO-GEN-132 HC$3.00 MF$0.65

HIGH-ENERGY SOLAR X-RAYS OF 7 JULY 1966.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 3B.
For abstract, see STAR 05 18.
N67-31542 HC$3.00 MF$0.65

EXPERIMENTAL STUDY OF SCATTERING IN ATOM- SURFACE COLLISIONS WITH ATOM ENERGIES OF THE ORDER OF E V,
California Univ., Los Angeles. Dept. of Engineering.
J. Alcalay. Jun 67, 133p NASA-CR-86653, REPT.-67-20
Grant NSG-237-62, Contract NSF GP-534

Descriptors: *Particle beam, *Scattering, *Solid surface, Argon, Atom, Beam, Collision, Detection, Distribution, Energy, Flux, Measurement, Molecular, Particle, Solid, Supersonic, Surface.

For abstract, see STAR 05 18.
N67-31556 HC$3.00 MF$0.65

ANGULAR DISTRIBUTIONS AND ENERGY SPECTRA OF ELECTRONS TRANSMITTED THROUGH AND REFLECTED FROM ELEMENTAL FOILS.
Naval Radiological Defense Lab., San Francisco, Calif.
R. M. Brown, W. E. Kreger, and B. W. Shumway. 6 Sep 67, 44p NASA-CR-85978, USNRDL-TR-1069
NASA ORDER R-142

Descriptors: *Angular distribution, *Electron energy, *Metal foil, Aluminum, Angular, Anthracene, Beam, Carbon, Copper, Crystal, Degradation, Detector, Distribution, Electron, Energy, Foil, Gold, Incidence, Metal, Monoenergetic, Radiation, Reflection, Shielding, Silver, Spectrometry, Spectrum, Thickness.

For abstract, see STAR 05 18.
N67-31706 HC$3.00 MF$0.65

REPORT PRESENTED AT INTERNATIONAL SYMPOSIUM ON ELECTRON AND POSITRON STORAGE RINGS, PART II.
Comitato Nazionale Per L Energia Nucleare, Frascati (Italy). Laboratori Nazionali Di Frascati.
For primary bibliographic entry see Field 20G.
For abstract, see STAR 05 18.
N67-31961 HC$3.00 MF$0.65

ANGULAR DISTRIBUTION OF THICK-TARGET BREMSSTRAHLUNG WHICH INCLUDES MULTIPLE ELECTRON SCATTERINGS.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
W. W. Scott. Aug 67, 35p NASA-TN-D-4063

Descriptors: *Angular distribution, *Bremsstrahlung, *Electron scattering, Angular, Distribution, Electron, Multiple, Photon, Radiation, Random, Scattering, Spectrum, Target, Thickness.

For abstract, see STAR 05 18.
N67-32121 HC$3.00 MF$0.65

SEARCH FOR THE GAMMA -2 GAMMA PROCESS IN NUCLEAR ELECTROSTATIC FIELDS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
D. C. Liu, and W. K. Roberts. Aug 67, 29p NASA-TM-X-1403
Contract 129-01-02-04-22

Descriptors: *Electrostatic field, *Nuclear interaction, *Particle emission, *Photon, Cross section, Detection, Electric, Electrostatic, Emission, Experiment, Field, Gamma, Interaction, Nuclear, Particle, Ray.

For abstract, see STAR 05 18.
N67-32323 HC$3.00 MF$0.65

INFLUENCE OF PARENT AND DAUGHTER DECAY ON TRACER DIFFUSION PROFILES.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
D. R. Behrendt. Aug 67, 11p NASA-TN-D-4099
Contract 129-03-15-01-22

Descriptors: *Differential equation, *Particle diffusion, *Radioactive decay, *Tracer, Calculation, Decay, Differential, Diffusion, Dimensional, Equation, Experiment, One, Parent, Particle, Profile, Radioactivity, Zirconium.

For abstract, see STAR 05 18.
N67-32370 HC$3.00 MF$0.65

ELECTRON PHYSICS TABLES,
National Bureau of Standards, Washington, D. C.
L. Marton, C. Marton, and W. G. Hall. 30 Mar 56, 85p NBS-Circular-571

Descriptors: (*Electrons, Dynamics), Magnetic fields, Equations of motion, Momentum, Standards, Kinetic energy, Voltage, Velocity, Tables, Field theory.
Identifiers: de Broglie wavelength.

The present tables of electron physics were prepared to replace the second half, called 'Electronic Functions' of the 'Miscellaneous Physical Tables, Planck's Radiation Functions and Electronic Functions' (MT17) issued by the National Bureau of Standards in 1941. Eight parameters have been

calculated on the Standards Electronic Automatic Computer (SEAC) and are tabulated with an eight digit accuracy.
PB-175 659 HC$3.00 MF$0.65

COMPENDIUM OF SHOCK WAVE DATA. SECTIONS B, C, D, INDEX,
California Univ., Livermore. Lawrence Radiation Lab.
M. Van Thiel. Jun 66, 322p
Contract W-7405-eng-48

Descriptors: (*Shock waves, Tables), Velocity, Accuracy, Pressure, Temperature, Density, Nuclear physics laboratories, Ultrasonic radiation, Interpolation, Data, Reduction, Equations of state, Nuclear particles.

For abstract, see NSA 21 15.
UCRL-50108-Vol-2 HC$3.00 MF$0.65

A CALCULATION OF THE AGE AND FAST EFFECT FOR MONOENERGETIC NEUTRONS IN BE AND BEO,
California Univ., Livermore. Lawrence Radiation Lab.
S. T. Perkins. Mar 67, 9p
Contract W-7405-eng-48

Descriptors: (*Beryllium compounds, Oxides), (*Beryllium, *Neutrons), Nuclear reactions, Neutron cross sections, Indium.

For abstract, see NSA 21 15.
UCRL-50229 HC$3.00 MF$0.65

20I. Plasma Physics

THE RESONANCE APPROXIMATION IN SUPERCONVERGENCE RELATIONS,
Imperial Coll of Science and Technology London (England) Dept of Physics
R. J. Rivers. Jun 67, 17p
AFOSR-67-1642
Grant AF-EOAR-12-67
Prepared in cooperation with International Centre for Theoretical Physics, Trieste (Italy), ICTP/67/27.

Descriptors: (*Pions, Nuclear scattering), (*Nuclear scattering, Approximation (Mathematics)), (*Particle trajectories, Approximation (Mathematics)), Regge poles, Moments, Nucleons, Nuclear spins, Nuclear resonance, Great Britain, Italy.

Assuming an exponential fall-off in elastic widths along a Regge trajectory (as suggested by both experiment and theory), it is suggested that any amplitude satisfies high (perhaps arbitrarily high) moment superconvergence relations in a resonance approximation. The experimental data is consistent with the existence of zeroth and second moment sum rules for the pi-N spin-flip amplitude. (Author)
AD-655 882 HC$3.00 MF$0.65

FOUNDATIONAL RESEARCH PROJECTS, JANUARY-MARCH 1967.
Naval Ordnance Lab Corona Calif
For primary bibliographic entry see Field 20L.
AD-655 889 HC$3.00 MF$0.65

CERTAIN COLLISIONS BETWEEN PROTONS AND DIATOMIC MOLECULES.
Physical Studies Inc Reno Nev
For primary bibliographic entry see Field 20H.
AD-655 911 HC$3.00 MF$0.65

DETERMINATION OF DEPARTURES FROM LOCAL THERMODYNAMIC EQUILIBRIUM IN ARC PLASMAS.
Final technical rept.,
Plasma Sciences Labs Inc Van Nuys Calif
H. N. Olsen, G. Bedjai, and R. E. Martindill. Mar 67, 102p
ARL-67-0060
Contract AF 33 (615)-5149

Descriptors: (*Plasma medium, *Thermodynamics), Reentry vehicles, Atmosphere entry, Plasma sheath, Flow fields, Argon.
Identifiers: Plasma diagnostics.

The concept of local thermodynamic equilibrium was investigated both theoretically and experimentally. Equilibrium characteristic curves were constructed from absolute spectral intensities of the several species of radiation emitted by the free-burning argon arc plasma. Measurements were made over the pressure range 0.1 < or = P < or = 1.1 atm. Complete local thermal equilibrium, in the sense that electrons and heavy particles have the same temperature, was observed for pressures above 0.3 atm. Transition probabilities measured in the course of the investigation were compared with those available in the literature. This comparison shows disagreement among investigators regarding the state of equilibrium existing even in the 1 atm plasma. (Author)
AD-655 934 HC$3.00 MF$0.65

CONSOLIDATED SEMIANNUAL PROGRESS REPORT.
University of Southern California Los Angeles Electronic Sciences Lab
For primary bibliographic entry see Field 20L.
AD-656 025 HC$3.00 MF$0.65

SOLUTION OF A CLASS OF SINGULAR INTEGRAL EQUATIONS.
Minnesota Univ Minneapolis
For primary bibliographic entry see Field 12A.
AD-656 026 Not available from CFSTI.

TEST OF THE DIRECT INTERACTION MODEL FOR ATOMIC REACTIONS: CORRELATION OF THE OUTGOING ELECTRONS IN ELECTRONIC IONIZATION.
New York Univ N Y Dept of Physics
For primary bibliographic entry see Field 7D.
AD-656 052 HC$3.00 MF$0.65

INVESTIGATION OF THE MECHANISMS ASSOCIATED WITH GAS BREAKDOWN UNDER INTENSE OPTICAL ILLUMINATION.
Semi-annual rept. 1 Jan-30 Jun 67,
United Aircraft Corp East Hartford Conn Research Labs
David C. Smith, and Alan F. Haught. 28 Jul 67, 35p Rept no. UACRL-F929272-10
Contract Nonr-4696 (00), ARPA Order-306

Descriptors: (*Gas ionization, Illumination), (*Gas lasers, Design), Plasma medium, Coherent radiation, Electromagnetic pulses, Shock waves, Interferometers, Gas discharges, Carbon dioxide.
Identifiers: Defender project.

The work reported is part of a series of experimental and theoretical investigations of the mechanisms responsible for gas breakdown with focused optical frequency laser radiation. The effects of the mode structure of the laser radiation source on the gas breakdown threshold were studied. Experiments were also performed using a Mach-Zehnder interferometer to observe the breakdown plasma density and to determine the persistence and growth rate of the associated blast wave. The development of a high-power CO2 laser with an output at 10.6-micron wavelength was continued.
AD-656 084 HC$3.00 MF$0.65

WAVES OF IONIZATION IN A CO2 DISCHARGE,
Aerospace Research Labs Wright-Patterson AFB Ohio
A. Garscadden, and D. A. Lee. 13 Mar 67, 6p Rept no. ARL-67-0127
Availability: Published in Physics Letters v24A n8 p431-2 Apr 1967.

Descriptors: (*Plasma oscillations, Carbon dioxide), (*Gas discharges, Stability), Gas ionization, Plasma medium, Ionization trails, Molecules.

The detection and identification of waves on ionization in a nominal CO2 discharge are reported. Influences of the molecular gas discharge properties on the dispersion are indicated. (Author)
AD-656 159 Not available from CFSTI.

ON ARC PUMPING AND THE MOTION OF ELECTRIC ARCS IN A TRANSVERSE MAGNETIC FIELD,
Aerospace Research Labs Wright-Patterson AFB Ohio
H. O. Schrade. Jun 67, 8p Rept no. ARL-67-0129
Availability: Published in Proceedings of International Conf. (7th) on Phenomena in Ionized Gases v1 p740-5 1966.

Descriptors: (*Magnetohydrodynamics, Mathematical analysis), Motion, Electric arcs, Magnetic fields, Thrust.
Identifiers: Retrograde motion (Plasma physics).

In a new unconventional analytical approach the transverse forces were calculated which act on an arbitarily curved current carrying plasma cylinder in a transverse magnetic field. These transverse forces consist of the Lorentz force in amperian direction and an electro-magnetically induced gas-dynamic thrust in retrograde direction. The balance of the forces and therefore the motion of the arc depend on the conditions of the outer-magnetic field, the self-magnetic field, and the curvature of the discharge axis. If the discharge channel moves relative to the outer cold gas, an additional transverse force corresponding to the drag of a heat source in a flow field must also be considered. The balance of these forces leads to an equation which in general permits the calculation of the curvature behavior of the discharge channel. Near the cathode surface a very small channel radius may be assumed to exist. If here the ratio of the strength of the self-magnetic field to that of the external field becomes larger than three, the discharge channel will bend in the retrograde direction. This bending can be so strong that the channel contacts the electrode again and establishes a new cathode spot, thus causing a discontinuous motion of the cathode spot in retrograde direction. (Author)
AD-656 208 Not available from CFSTI.

PLASMA TRANSPORT AND STABILITY IN A 'MINIMUM-B' MAGNETIC FIELD.
Final rept.,
Sperry Rand Research Center Sudbury Mass
W. D. McBee, J. A. Decker, P. J. Freyheit, and S. Gruber. Apr 67, 115p Rept no. SRRC-CR-67-15
AFOSR-67-1785
Contract AF 49 (638)-1541

Descriptors: (*Plasma physics, *Transport properties), Magnetic fields, Thermonuclear reactions, Stability, Thermal properties, Cesium, Velocity, Plasma oscillations, Distortion, Temperature, Diffusion, Theory, Design.

The report covers the second year's effort under a program of research into fusion-plasma containment, transport and stability in which a relatively small, versatile, accessible and inexpensive thermally-ionized cesium plasma is used as an experimental simulant for a hot fusion plasma. The characteristics of the simulant plasma and the basis of simulation have been presented earlier; this report will cover the detailed investigation of

'anomalous' plasma transport in the simulant plasma of the TOPSY Q-device-with special attention to a possible correlation of plasma transport and low-frequency plasma oscillations and to ionizer-temperature-gradient effects-in uniform axial and 'minimum-B magnetic field geometries, as well as some preliminary results of a continuing investigation into ion-velocity-anisotropy driven 'microinstabilities'. (Author)
AD-656 341 HC$3.00 MF$0.65

WAVE INTERACTION IN NONRELATIVISTIC ELECTRON BEAM-PLASMA SYSTEMS,
Case Inst of Tech Cleveland Ohio
Gerald A. Otteni. Jul 67, 152p Rept no. Scientific-17
AFCRL-67-0375
Contract AF 19 (628)-1699

Descriptors: (*Plasma medium, *Electron beams), Interactions, Magnetic fields, Propagation, Penetration, Mathematical models, Temperature, Electromagnetic fields.

A theoretical model based on the linearization of the fluid equations and Maxwell's equations for wave interaction in a uniform plasma which is interpenetrated by a nonrelativistic electron beam is developed. The effects of electron-neutral and electron-ion collisions and temperatures of both the beam and plasma electrons are included and no quasi-static approximation is made for the electromagnetic field. An external d.c. magnetic field is assumed to act so that a general formulation is developed which is valid in the limit of small d.c. magnetic fields and in the limit as the field becomes very large. Graphs of the computer solutions are given for the propagation constants in a beam-plasma system for the cases of an unbounded system and for the TM wave solutions that may exist in an axisymmetric cylindrical system in which the finite beam interpenetrates an unbounded plasma. (Author)
AD-656 346 HC$3.00 MF$0.65

TEXAS BIANNUAL OF ELECTRONICS RESEARCH, NO. 5.
Texas Univ Austin Labs for Electronics and Related Science Research
For primary bibliographic entry see Field 9C.
AD-656 349 HC$3.00 MF$0.65

THE ABSORPTION OF X-RAYS BY INTERSTELLAR GAS,
Queen'S Univ Belfast (Northern Ireland) Dept of Applied Mathematics
For primary bibliographic entry see Field 4A.
AD-656 352 Not available from CFSTI.

EXCITED ATOMS IN DECAYING OPTICALLY THICK PLASMAS,
Queen'S Univ Belfast (Northern Ireland) School of Physics and Applied Mathematics
D. R. Bates, K. L. Bell, and A. E. Kingston. 28 Sep 66, 12p
Contract N62558-4297
Availability: Published in Proc. Phys. Soc. v91 p288-99 1967.

Descriptors: (*Plasma medium, *Atomic energy levels), (*Hydrogen, Relaxation time), Gas ionization, Electron transitions, Quantum statistics, Atoms, Excitation, Recombination reactions, Great Britain.

With attention confined to decaying H-H (+)-e and He-He (+)-e plasmas which are optically thick towards lines ending on the ground level, the quasi-equilibrium number density of atoms in the first excited level n sub Q' (2) is computed using collisional deactivation coefficients K (2,1) based on experiment and taking Penning ionization into account. This last is discussed in some detail. Quantal calculations are carried out on the rate at which the electronic transitions involved in 2H (2s-p) to H (1s) + H (+) + e occur. It is concluded that the rate is probably fast enough for almost all close collisions to lead to ionization. This also seems to be the case for 2He (2 triplet S) to He (1 singlet S) + He (+) + e provided collisions which can yield ionization only by violation of Wigner's spin conservation rule are excluded from consideration. Penning ionization is of little importance in hydrogen plasmas, but it can be significant in helium plasmas where it tends to reduce n sub Q' (2) and the apparent recombination coefficient. (Author)
AD-656 354 Not available from CFSTI.

ANALYTICAL AND EXPERIMENTAL STUDIES OF MICROWAVE INTERACTION WITH A HYPERSONIC AIR PLASMA,
Cornell Aeronautical Lab Inc Buffalo N Y
Donald W. Boyer, and Dean R. Bitikofer. Feb 67, 120p Rept no. Scientific-1, CAL-AA-2053-Y-1
AFCRL-67-0201
Contract AF 19 (628)-4968

Descriptors: (*Antenna radiation patterns, *Plasma sheath), Hypersonic flow, Microwaves, Interactions, C band, S band, Radiofrequency interference, Antennas, Nonequilibrium flow, Propagation, Afterbodies, Shock waves, Reentry vehicles.

Analytical and experimental studies are described of phenomena associated with the interaction of microwave radiation with the aerodynamically generated plasma surrounding a hemisphere-cylinder model in the CAL High Energy Shock Tunnel. The program consisted of three parts, namely, (1) measurements of the changes in antenna radiation patterns at C-band (4.25 GHz), (2) an investigation of antenna breakdown, and nonlinear signal transmission effects, at S-band (2.7 GHz), and (3) measurements of the coupling between two antennas at S-band. Nonequilibrium flow field calculations are discussed which describe the plasma properties in the vicinity of the antennas on the model. Analytical calculations have also included the computation of the complex transmission and reflection coefficients for microwave propagation through the inhomogeneous afterbody shock layer plasma. A Phase I series of experiments measured the effect of the hypervelocity plasma on the radiation pattern of a C-band transmitting antenna located on the model cylindrical afterbody. A Phase II experimental program investigated nonlinear interaction effects due to propagation of variable high power S-band pulse radiation through the afterbody shock layer plasma. (Author)
AD-656 358 HC$3.00 MF$0.65

DISTRIBUTION OF ENERGY IN ELECTRICAL DISCHARGES.
Toronto Univ (Ontario) Lash Miller Chemical Labs
For primary bibliographic entry see Field 7D.
AD-656 434 HC$3.00 MF$0.65

CYCLOTRON ECHOES IN PLASMAS.
Technical rept.,
Lockheed Missiles and Space Co Palo Alto Calif
Lockheed Palo Alto Research Lab
G. F. Herrmann, R. M. Hill, and D. E. Kaplan. 10 Oct 66, 20p Rept no. TR-12
Contracts Nonr-2541 (00), AF 19 (628)-5932
Availability: Published in The Physical Review v156 n1 p118-33 Apr 5, 1967.

Descriptors: (*Plasma medium, Cyclotron resonance phenomena), (*Delay lines, Microwaves), Magnetic fields, Electrons, Nitrogen, Afterglows, Coherent radiation, Diffusion, Electromagnetic fields, Mathematical models.
Identifiers: Cyclotron echoes.

Experimental observations of cyclotron echo phenomena in rare-gas and nitrogen afterglow plasmas in the presence of a slightly inhomogeneous magnetic field are presented. The formation of cyclotron echoes is treated theoretically, and specialized to the case of a velocity-dependent collision frequency mechanism, which seems to best explain our experimental observations. Detailed calculations for this case, including such factors as echo amplitude, echo lifetime, and the form of echo decay envelopes, are made and related to the present experimental results. Comparison is made with other mechanisms of cyclotron echo formation. In addition, a detailed discussion of the effects on two-pulse and three-pulse echo amplitude due to electron diffusion into regions of inhomogeneous magnetic field is included. (Author)
AD-656 555 Not available from CFSTI.

IONIZING SHOCK STUDIES IN AN ELECTROMAGNETICALLY DRIVEN SHOCK TUBE,
Columbia Univ New York
B. Miller, L. Levine, and R. A. Gross. Apr 65, 18p
AFOSR-67-1818
Contract AF 49 (638)-1254
Availability: Published in Proceedings of the International Shock Tube Symposium (5th), White Oak, Md., 28-30 Apr 65.

Descriptors: (*Plasma generators, Shock tubes), (*Shock tubes, Gas ionization), (*Shock waves, Propagation), Electromagnetic fields, Hydrogen, Magnetohydrodynamics.

A one meter long, seven centimeter mean radius, coaxial electromagnetic shock tube with a one centimeter annulus was used to study strong ionizing shock waves propagating through hydrogen. The shock tube, shaped-pulse capacitor bank, and associated circuitry are described. Experimental techniques used to successfully obtain uniform breakdown and the launching of plane ionizing shock waves are presented. Diagnostic studies with photomultipliers and magnetic and electric field probes are discussed. Constant speed normal ionizing shock waves propagating at 2,000,000 to 8,000,000 cm/sec were studied. Variation of the longitudinal magnetic field between 800 and 12,000 g. produced sub-Alfvenic, switch-on, and super-Alfvenic shock waves. The influence of the initial gas state, including the electric field, on the shock jump conditions is discussed. The effect of initial conditions on shock formation time was observed. Analysis of magnetic field profiles led to quantitative shock width data and to the identification of a switch-on-like shock. A comparison between theoretical and measured wave speed and magnetic field as a function of drive current is presented. (Author)
AD-656 716 Not available from CFSTI.

AXISYMMETRIC MODES IN HYDROMAGNETIC WAVEGUIDE.
Technical rept.,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Gerald B. Kliman. 28 Feb 67, 108p Rept no. TR-449
Contract DA-36-039-AMC-03200 (E), Grant NSF-GK-524
Doctoral thesis.

Descriptors: (*Magnetohydrodynamics, *Waveguides), Axially symmetric flow, Magnetic fields, Kinetic energy, Theory, Viscosity, Conductivity, Density, Motion, Boundary layer, Liquid metals, Fluids, Resonant frequency, Equations, Measurement.

The axisymmetric, transverse magnetic field modes of a hydromagnetic or Alfven waveguide are studied experimentally and theoretically. An experiment was performed to examine with precision measurements the steady-state half-wave resonances of a short section of hydromagnetic waveguide with a liquid metal (NaK) used as the fluid conductor. The response to a step of current was also examined. The theory of uniform hydromag-

netic waveguides is reviewed and extended by reconsideration of the propagation constant and theories for the effects of transverse fields, viscosity, finite conductivity walls, and bulk motion. A theory predicting the effects of nonuniform density or magnetic field is developed and verified in the experiment. (Author)
AD-656 720 HC$3.00 MF$0.65

NONEQUILIBRIUM RADIATION AND IONIZATION IN SHOCK WAVES,
Purdue Univ Lafayette Ind School of Aeronautics Astronautics and Engineering Sciences
For primary bibliographic entry see Field 20D.
AD-656 767 HC$3.00 MF$0.65

THE SCATTERING OF ELECTROMAGNETIC WAVES FROM A PLASMA-IMMERSED CYLINDER SCIENTIFIC REPORT.
Michigan Univ., Ann Arbor. High Altitude Engineering Lab.
E. K. Miller. Dec 66, 27p NASA-CR-86631, REPT.-05627-6-S
Contract NASR-54/05/

Descriptors: *Compressibility effect, *Electromagnetic wave, *Plasma sheath, *Scattering cross section, Boundary, Coefficient, Compressibility, Condition, Coupling, Cross, Cylinder, Effect, Electromagnetic, Electron, Incidence, Model, Plasma, Scattering, Section, Sheath, Temperature, Transverse, Vacuum, Wave.

For abstract, see STAR 05 18.
N67-31813 HC$3.00 MF$0.65

INVESTIGATION OF AZIMUTHAL INHOMOGENEITY OF PLASMA IN A HOMOPOLAR.
Issledovaniye Azimutal'noy Neodnorodnosti Plazmy V Gomopolyarnike
National Aeronautics and Space Administration, Washington, D. C.
E. M. Drobyshevskiy, S. I. Rozov, and A. M. Studenkov. Jul 67, 7p NASA-TT-F-11110
Transl. Into English From Zh. Tekh. Fiz. (Leningrad), V. 37, No. 5, 1967 P 979-983

Descriptors: *Inhomogeneity, *Plasma acceleration, Acceleration, Azimuth, Blocking, Canal, Cathode, Current, Determination, Direction, Electrode, Flow, Free, Hall effect, Oscillograph, Photomultiplier, Plasma, Probe, Solenoid, Spot, Velocity.

For abstract, see STAR 05 18.
N67-31848 HC$3.00 MF$0.65

THE INFLUENCE OF ENERGY-DEPENDENT RELAXATION TIMES AND CHARGECARRIER MASS ON IONIZATION WAVES IN PLASMAS.
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Microwave.
B. Andersson. 1 Feb 67, 38p RADC-TR-67-322, SR-16
Contract AF 61/052/-895

Descriptors: *Charge, *Gaseous ionization, *Plasma, *Relaxation time, Alloy, Antimony, Carrier, Dependence, Dielectric, Energy, Gas, Indium, Influence, Ionization, Mass, Property, Relaxation, Semiconductor, Stability, Time, Wave.

For abstract, see STAR 05 18.
N67-32154 HC$3.00 MF$0.65

ORNL TARGET PLASMA PROGRAM,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18A.
For abstract, see NSA 21 15.
ORNL-4080 HC$3.00 MF$0.65

BIBLIOGRAPHY ON WAVES IN PLASMAS,
Institute for Telecommunication Sciences and Aeronomy, Boulder, Colo.
For primary bibliographic entry see Field 20N.
PB-175 657 HC$3.00 MF$0.65

REPORT OF AD HOC PANEL ON SCYLLAC.
Division of Technical Information Extension (AEC) Oak Ridge, Tenn.
For primary bibliographic entry see Field 18A.
For abstract, see NSA 21 15.
TID-23705 HC$3.00 MF$0.65

CHERENKOV TRAPPING OF CURRENT LOOPS IN A PLASMA,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 18A.
For abstract, see NSA 21 15.
UCRL-50187 HC$3.00 MF$0.65

20J. Quantum Theory

ON THE STRUCTURE OF HYDRODYNAMIC AND ELECTRODYNAMIC FIELDS. PART I. VECTOR EXPANSIONS IN RECTANGULAR COORDINATES.
Technical rept.,
Dugway Proving Ground Utah
Keith L. McDonald. Aug 59, 45p Rept no. DPG-R-240
See also AD-655 847.

Descriptors: (*Electromagnetic fields, Mathematical analysis), Solenoids, Quantum mechanics, Hydrodynamics, Vector analysis, Field theory.

In a previous paper the author discussed the linear component fields appearing in the Taylor expansion of an arbitrary solenoidal vector. The present work complements these fields to include those vectors with a non-vanishing divergence. The second and third order fields are treated extensively for both the solenoidal and divergence cases. A general scheme for treating higher order fields is also presented. Field structures are pictorially elucidated by means of figures showing vector lines of force. (Author)
AD-655 846 HC$3.00 MF$0.65

ON THE STRUCTURE OF HYDRODYNAMIC AND ELECTRODYNAMIC FIELDS. PART II. DISTRIBUTION OF TYPE (b) SINGULARITIES IN THE EUCLIDEAN COMPLEX PLANE.
Technical rept.,
Dugway Proving Ground Utah
Keith Leon McDonald. May 60, 53p Rept no. DPG-R-240-Pt-2
See also AD-655 846.

Descriptors: (*Electromagnetic fields, Mathematical analysis), Field theory, Quantum mechanics, Hydrodynamics, Complex variables, Topology, Analytic functions.

The work is a study of the topology of the two-dimensional vector field of an analytic function of a complex variable. There is presented an analysis treating on the existence and distribution of type (b) singularities (stationary points), at points of the Euclidean complex plane. Branch points and branch cuts are also discussed. Vector field structures in the neighborhoods of these points are pictorially elucidated by means of figures showing the orthogonal systems of conjugate u,v families of curves. (Author)
AD-655 847 HC$3.00 MF$0.65

LIMITATIONS OF PION POLE DOMINANCE,
Cambridge Univ (England) Dept of Applied Mathematics and Theoretical Physics
For primary bibliographic entry see Field 20H.
AD-655 877 HC$3.00 MF$0.65

WEINBERG SUM RULES AND SCALAR MESONS,
Cambridge Univ (England) Dept of Applied Mathematics and Theoretical Physics
For primary bibliographic entry see Field 20H.
AD-655 879 HC$3.00 MF$0.65

SIMPLIFIED MODEL FOR A THREE-PARTICLE REGGE TRAJECTORY,
Cambridge Univ (England) Dept of Applied Mathematics and Theoretical Physics
For primary bibliographic entry see Field 20H.
AD-655 880 Not available from CFSTI.

COHERENT SOFT PHOTON STATES AND INFRA-RED DIVERGENCES. I. CLASSICAL CURRENTS,
Imperial Coll of Science and Technology London (England)
T. W. B. Kibble. Apr 67, 38p
AFOSR-67-1599
Grant AF-EOAR-12-67

Descriptors: (*Photons, Hilbert space), Coherent radiation, Infrared radiation, Field theory, Tensor analysis, Electromagnetic fields, Operators (Mathematics), Great Britain.

As a first step towards a treatment of soft photon processes which is free of infrared divergences and avoids the necessity of introducing a fictitious photon mass, the specification of asymptotic photon states belonging to non-Fock representations is discussed. As in the work of Chung, a basis consisting of generalized coherent states is used, but in contrast to his work, these states are rigorously defined in terms of von Neumann's infinite tensor product. It is shown that the states must be given an additional label which serves to distinguish various 'weekly equivalent' vectors, and which corresponds formally to an infinite phase factor. A nonseparable Hilbert space H sub IR is defined (as a subspace of the infinite tensor product space) which may be regarded as the space of all possible asymptotic photon states. The interaction of the electromagnetic field with a prescribed classical current distribution is discussed, and it is shown that a unitary S operator all of whose matrix elements are finite may be defined on H sub IR. (Author)
AD-655 881 HC$3.00 MF$0.65

THE RESONANCE APPROXIMATION IN SUPERCONVERGENCE RELATIONS,
Imperial Coll of Science and Technology London (England) Dept of Physics
For primary bibliographic entry see Field 20I.
AD-655 882 HC$3.00 MF$0.65

REGGEIZATION OF INVARIANT AMPLITUDES,
Imperial Coll of Science and Technology London (England) Dept of Physics
For primary bibliographic entry see Field 20H.
AD-655 883 HC$3.00 MF$0.65

COVARIANT PROPAGATORS AND VERTEX FUNCTIONS FOR ANY SPIN,
Imperial Coll of Science and Technology London (England) Dept of Physics
For primary bibliographic entry see Field 20H.
AD-655 886 HC$3.00 MF$0.65

THE STABILITY OF CONTINUALLY CREATED MASS AGAINST GRAVITATIONAL DECAY,
Cornell Univ Ithaca N Y Center for Radiophysics and Space Research
For primary bibliographic entry see Field 20H.
AD-655 918 HC$3.00 MF$0.65

DERIVATION OF MASS SPECTRUM AND MAGNETIC MOMENTS FROM CURRENT CONSERVATION IN RELATIVISTIC 0 (3,1) AND 0 (4,2) - THEORIES,
Colorado Univ Boulder Dept of Physics
For primary bibliographic entry see Field 20H.
AD-655 926 HC$3.00 MF$0.65

STRUCTURE OF THE 'ETA MESON TO 3 PION' AMPLITUDE,
Maryland Univ College Park Dept of Physics and Astronomy
For primary bibliographic entry see Field 20H.
AD-655 947 Not available from CFSTI.

GREEN'S THEOREM AND INVARIANT TRANSFORMATIONS,
Syracuse Univ N Y Dept of Physics
Joshua N. Goldberg. Apr 67, 20p
AFOSR-67-1644
Grants AF-AFOSR-789-66, NSF-CP-5643

Descriptors: (*Transformations (Mathematics), Invariance), Relativity theory, Tensor analysis, Field theory, Operators (Mathematics), Green's function, Partial differential equations.
Identifiers: Wave equation.

Conservation laws are derived with the use of Green's theorem. These are studied specifically for the wave equation. A trivial class of invariant transformations exists which maps solutions into solutions. The mapping consists in the addition of a particular solution to all solutions. Because of the linearity of the wave equation, this sum will again be a solution. It is shown that this class of transformations has the Newman-Penrose constants among its generators. Calculations are carried out explicitly for the scalar wave equation and for Maxwell's equations. (Author)
AD-655 964 HC$3.00 MF$0.65

SOLID-STATE AND MOLECULAR THEORY GROUP.
Massachusetts Inst of Tech Cambridge
For primary bibliographic entry see Field 20L.
AD-655 966 HC$3.00 MF$0.65

AMOUNT OF FOUR-PARTICLE PRODUCTION REQUIRED IN S-MATRIX THEORY,
Maryland Univ College Park Dept of Physics and Astronomy
For primary bibliographic entry see Field 20H.
AD-655 972 Not available from CFSTI.

U (6,6) AND SUPERCONVERGENT SUM RULES FOR MESON-BARYON SCATTERING,
Imperial Coll of Science and Technology London (England) Dept of Physics
For primary bibliographic entry see Field 20H.
AD-656 001 HC$3.00 MF$0.65

PERTURBATION THEORY EXPANSIONS THROUGH 20TH ORDER OF MASS POLARIZATION CORRECTION, RELATIVISTIC EFFECTS AND LAMB SHIFT OF THE TWO-ELECTRON SYSTEM (1s)2 1S,
Oslo Univ (Norway) Inst for Theoretical Physics
For primary bibliographic entry see Field 7D.
AD-656 002 Not available from CFSTI.

THE RELATIVISTIC POSITION OPERATOR AT SUBATOMIC LEVEL,
Kent Univ Canterbury (England)
L. Castell. 22 Oct 66, 8p
AFOSR-67-1774
Grant AF-EOAR-61-64
Prepared for presentation at the Conference on Nuclear Structure and Elementary Particles, Oxford 30 Mar 1966. Prepared in cooperation with Trinity Coll. Dublin (Eire).
Availability: Published in Il Nuovo Cimento v49 Ser10 p285-90 May 21 1967.

Descriptors: (*Elementary particles, Operators (Mathematics)), Algebras, Groups (Mathematics), Quantum mechanics, Relativity theory, Great Britain.

A certain class of Lie algebras which contain the Lie algebra of the inhomogeneous Lorentz group and the relativistic position operators is derived, and it is shown how the Lie algebra of quantum mechanics is connected with the Lie algebra of the group SO sub 4,2. (Author)
AD-656 006 Not available from CFSTI.

O (4) SYMMETRY AND REGGE-POLE THEORY,
California Univ Berkeley Dept of Physics
For primary bibliographic entry see Field 20H.
AD-656 024 Not available from CFSTI.

EIGENVALUE PROBLEM IN A LINEARLY DEPENDENT BASIS AND THE SUPER SECULAR EQUATION,
Uppsala Univ (Sweden) Quantum Chemistry Group
Per-Olov Lowdin. 1 Jun 67, 31p Rept no. Scientific-32
Contract AF 61 (052)-874
Availability: Published in Unidentified journal.

Descriptors: (*Wave functions, Equations), Hamiltonian, Vector spaces, Matrix algebra, Groups (Mathematics), Sweden.

The solution of the Schrodinger equation H (Omega) = E (Omega) is discussed in terms of a basis Phi = the set Phi sub k of n functions of which only p are linearly independent. The method is applied to the problem of the group-theoretical splitting of the secular equation due to symmetry properties of the Hamiltonian. Following Byers-Brown, it is shown that a block of the secular equation corresponding to a specific irreducible representation alpha depends only on the characters Chi exp. alpha and not on the full matrices gamma exp. alpha. (Author)
AD-656 038 Not available from CFSTI.

CORRELATION EFFECTS IN THE BAND STRUCTURE OF GRAPHITE,
Uppsala Univ (Sweden) Quantum Chemistry Group
For primary bibliographic entry see Field 20L.
AD-656 039 Not available from CFSTI.

ODD QUEERNESSES IN THE DEFORMATION CHART,
Instituto de Investigacion Aeronautica Y Espacial Buenos Aires (Argentina) Laboratorio de Radiaciones
For primary bibliographic entry see Field 20H.
AD-656 136 Not available from CFSTI.

SYMMETRY BREAKING IN NON-ABELIAN GAUGE THEORIES,
Imperial Coll of Science and Technology London (England) Dept of Physics
T. W. B. Kibble. 24 Oct 66, 10p
AFOSR-67-1750
Grant AF-EOAR-12-67
Availability: Published in The Physical Review v155 n5 p1554-61 Mar 25 1967.

Descriptors: (*Elementary particles, Groups (Mathematics)), (*Decay schemes, Mathematical models), Field theory, Relativity theory, Hilbert space, Bosons, Photons, Great Britain.
Identifiers: Gauge theory, Goldstone's theorem, Massless particles, Symmetry (Quantum mechanics).

According to the Goldstone theorem, any manifestly covariant broken-symmetry theory must exhibit massless particles. However, it is known from previous work that such particles need not appear in a relativistic theory such as radiation-gauge electrodynamics, which lacks manifest covariance. Higgs has shown how the massless Goldstone particles may be eliminated from a theory with broken U (1) symmetry by coupling in the electromagnetic field. The primary purpose of the paper is to discuss the analogous problem for the case of broken non-Abelian gauge symmetries. In particular, a model is exhibited which shows how the number of massless particles in a theory of this type is determined, and the possibility of having a broken non-Abelian gauge symmetry with no massless particles whatever is established. A secondary purpose is to investigate the relationship between the radiation-gauge and Lorentz-gauge formalisms. The Abelian-gauge case is reexamined, in order to show that, contrary to some previous assertions, the Lorentz-gauge formalism, properly handled, is perfectly consistent, and leads to physical conclusions identical with those reached using the radiation gauge. (Author)
AD-656 144 Not available from CFSTI.

MASS EMPIRICS,
Harvard Univ Cambridge Mass
Julian Schwinger. 13 Apr 67, 3p
AFOSR-67-1718
Contract AF 49 (638)-1380
Availability: Published in Physical Review Letters v18 n19 p797-8 May 8 1967.

Descriptors: (*Baryons, *Mass spectrum), Tensor analysis, Field theory, Nuclear resonance.

An empirical observation concerning the mass spectral of the baryon octuplet and the baryon resonance decuplet is given: the respective fractional mass splittings are identical. (Author)
AD-656 210 Not available from CFSTI.

DECAY MODES 'ETA MESON TO POS. PION + NEG. PION + NEUT. PION + GAMMA PHOTON' AND 'ETA MESON TO NEUT. PION + 2 GAMMA PHOTONS',
Stanford Univ Calif Dept of Physics
For primary bibliographic entry see Field 20H.
AD-656 218 Not available from CFSTI.

TEXAS BIANNUAL OF ELECTRONICS RESEARCH, NO. 5.
Texas Univ Austin Labs for Electronics and Related Science Research
For primary bibliographic entry see Field 9C.
AD-656 349 HC$3.00 MF$0.65

THE ABSORPTION OF X-RAYS BY INTERSTELLAR GAS,
Queen'S Univ Belfast (Northern Ireland) Dept of Applied Mathematics
For primary bibliographic entry see Field 4A.
AD-656 352 Not available from CFSTI.

BOUND STATES OF AN ELECTRON IN A DIPOLE FIELD,
Queen'S Univ Belfast (Northern Ireland) School of Physics and Applied Mathematics
For primary bibliographic entry see Field 7D.
AD-656 353 Not available from CFSTI.

EFFECTIVE OPERATOR FORMALISM IN OPTICAL PUMPING,
Columbia Radiation Lab New York
For primary bibliographic entry see Field 20F.
AD-656 474 Not available from CFSTI.

GRAVITATION IN FLAT SPACE-TIME,
Defence Research Telecommunications Establishment Ottawa (Ontario)

Group 20J—Quantum theory

J. C. W. Scott. 1967, 2p
Availability: Published in Nature v213 n5078 p767-8 Feb 25 1967.

Descriptors: (*Gravity, *Relativity theory), (*Electromagnetic fields, Relativity theory), Light, Velocity, Tensor analysis, Sun, Mercury, Orbital trajectories, Canada.
Identifiers: Space-time symmetries.

Einstein's general theory of relativity deals quite differently with gravitational and electromagnetic fields. A more symmetrical treatment is given. Unlike Einstein's theory, it predicts that the speed of light remains constant even when measured across a gravitational field.
AD-656 675 Not available from CFSTI.

DYNAMICAL THEORY OF BARYONS AND LEPTONS,
Miami Univ Coral Gables Fla Center for Theoretical Studies
For primary bibliographic entry see Field 20H.
AD-656 753 HC$3.00 MF$0.65

X-RAY SCATTERING BIBLIOGRAPHY.
Kaman Nuclear Colorado Springs Colo
For primary bibliographic entry see Field 20H.
AD-656 759 HC$3.00 MF$0.65

THE PHYSICAL TENSOR AND APPLICATION FINAL SCIENTIFIC REPORT, 1 NOV. 1965 - 31 JAN. 1967.
Israel Inst. of Tech., Haifa. Dept. of Mechanics.
For primary bibliographic entry see Field 12A.
For abstract, see STAR 05 18.
N67-31638 HC$3.00 MF$0.65

ON A CLASS OF WAVE EQUATIONS.
Technische Hogeschool, Eindhoven (Netherlands).
For primary bibliographic entry see Field 12A.
For abstract, see STAR 05 18.
N67-32471 HC$3.00 MF$0.65

ELECTRON PHYSICS TABLES,
National Bureau of Standards, Washington, D. C.
For primary bibliographic entry see Field 20H.
PB-175 659 HC$3.00 MF$0.65

20K. Solid Mechanics

THE CHANGE IN ELECTRICAL RESISTIVITY WITH PLASTIC DEFORMATION OF COPPER AT DIFFERENT STRAIN RATES,
Clarkson Coll of Technology Potsdam N Y Dept of Physics
For primary bibliographic entry see Field 20C.
AD-655 858 Not available from CFSTI.

CRASH LOADS ENVIRONMENT STUDY.
Mechanics Research Inc El Segundo Calif
For primary bibliographic entry see Field 1C.
AD-655 920 HC$3.00 MF$0.65

DISPLACEMENT BOUNDS FOR DYNAMICALLY LOADED ELASTIC STRUCTURES,
Brown Univ Providence R I Div of Engineering
J. B. Martin. Mar 67, 26p Rept no. TR-9
Contract N189 (181)-60723A (X)

Descriptors: (*Structures, Deformation), Elasticity, Loading (Mechanics), Mathematical analysis, Dynamics, Elastic shells, Stresses.

A simplified derivation of an earlier result for finding upper bounds on displacements for dynamically loaded elastic structures is presented. The new derivation permits a better physical appreciation of the technique, and shows that in certain cases the method can be extended to cover plates and fixed beams in which membrane forces due to geometry changes occur. (Author)
AD-655 924 HC$3.00 MF$0.65

A METHOD FOR WEIGHT OPTIMIZATION OF FLAT TRUSS-CORE SANDWICH PANELS UNDER LATERAL LOADS.
Structural Mechanics Associates Narberth Pa
For primary bibliographic entry see Field 13M.
AD-656 054 HC$3.00 MF$0.65

STRUCTURAL OPTIMIZATION OF FLAT, CORRUGATED CORE AND WEB-CORE SANDWICH PANELS UNDER IN-PLANE SHEAR LOADS AND COMBINED UNIAXIAL COMPRESSION AND IN-PLANE SHEAR LOADS.
Structural Mechanics Associates Narberth Pa
For primary bibliographic entry see Field 13M.
AD-656 056 HC$3.00 MF$0.65

A REDUNDANT-FORCE METHOD FOR THE INELASTIC ANALYSIS OF MECHANICALLY FASTENED JOINTS,
North American Aviation Inc Columbus Ohio Columbus Div
For primary bibliographic entry see Field 13E.
AD-656 057 HC$3.00 MF$0.65

GROUP-VELOCITY DISPERSION DUE TO PULSE REFLECTION FROM A FREQUENCY-DEPENDENT BOUNDARY IMPEDANCE,
Pennsylvania State Univ University Park Dept of Physics
For primary bibliographic entry see Field 20A.
AD-656 128 Not available from CFSTI.

THE VIBRATION AND BUCKLING CHARACTERISTICS OF CYLINDRICAL SHELLS UNDER AXIAL LOAD AND EXTERNAL PRESSURE.
Technical rept.,
Air Force Flight Dynamics Lab Wright-Patterson AFB Ohio
William F. Bozich. May 67, 107p Rept no.
AFFDL-TR-67-28

Descriptors: (*Structural shells, Loading (Mechanics)), (*Cylindrical bodies, Loading (Mechanics)), Vibration, Buckling (Mechanics), Pressure, Differential equations.

The Galerkin method is applied to Flugge's differential equations for the vibration of a cylindrical shell under axial load and external pressure to obtain a 3N x 3N characteristic equation in matrix form. N is the number of terms in the assumed series of displacement functions for the u, v, and w displacements which can be selected to satisfy various boundary conditions. For the freely-supported cylinder an exact solution exists, and the various assumed modes uncouple, reducing the problem to the solution of a 3 x 3 characteristic equation for each mode. The third order characteristic equation for the freely-supported cylinder was solved for a wide range of shell parameters. The natural vibration frequencies and buckling values for axial load and external pressure for all three eigenvalues associated with each mode, are presented in a series of figures. The square of the vibration frequency for any mode was found to vary linearly with axial load, and approximately linearly with a pressure loading for modes with two or more circumferential waves. (Author)
AD-656 302 HC$3.00 MF$0.65

DYNAMICS OF A TWO-LAYERED TIMOSHENKO-TYPE CYLINDRICAL SHELL INCLUDING THE EFFECTS OF SHEAR DEFORMATION OF THE INTERLAYER BOND,
Aerospace Corp El Segundo Calif Labs Div
J. P. Jones, and J. S. Whittier. Jun 67, 41p Rept no. TR-1001 (2240-30)-7
SSD-TR-67-119
Contract AF 04 (695)-1001

Descriptors: (*Structural shells, Mechanical properties), (*Cylindrical bodies, Mechanical properties), Bonding, Shear stresses, Deformation, Dynamics, Equations of motion, Propagation.

Equations of (axially symmmetric) motion are derived for a cylindrical shell whose two layers are connected by a thin, deformable bond. Effects of shear deformation and rotatory inertia are accounted for in each of the shell layers. A thin, inertialess, interlayer bond that deforms only in shear is assumed. A nondimensional bond stiffness parameter is introduced, and the effect of bond stiffness on the dynamic behavior of the shell is investigated for the case of axial wave propagation in an infinitely long shell. The bond stiffness parameter has a profound influence on some of the wave propagation frequencies. An expression is given for a critical value of the bond stiffness parameter that separates 'stiff' and 'soft' bonds. For the limiting cases of very stiff or very soft bonds, simplified theoretical approaches give adequate accuracy; however, it appears necessary to use the theory in full for bonds of intermediate thickness. (Author)
AD-656 338 HC$3.00 MF$0.65

THE LAMBDA METHOD FOR BOUNDARY VALUE PROBLEMS.
Interim scientific rept.,
University Coll Cork (Ireland) Dept of Mathematical Physics
G. V. Kelly, and P. M. Quinlan. Feb 67, 167p
AFOSR-67-0975
Grant AF-EOAR-40-65

Descriptors: (*Boundary value problems, Metal plates), Theses, Mathematical models, Computer programs, Convergence, Load distribution, Simultaneous equations, Elasticity, Mathematical analysis.
Identifiers: Lambda method.

The lambda-Method is checked against existing solutions for uniformly loaded square and skew plates and methods for accelerating the convergence of the solutions are developed. Symmetrical edge-functions are developed and applied to a regular polygonal plate of 4n sides. A comprehensive treatment is given of skew and rectangular plates supported by flexible beams. The solution in all cases gives an exact solution to the mathematical model, where the calculated boundary residuals replace the specified boundary conditions. A Fortran (1620) Programme is appended for the quadrilateral plate. (Author)
AD-656 391 HC$3.00 MF$0.65

STRESS AND DEFLECTION ANALYSIS OF FIBROUS COMPOSITE MATERIALS UNDER EXTERNAL LOAD.
Ohio State Univ Research Foundation Columbus
For primary bibliographic entry see Field 11D.
AD-656 431 HC$3.00 MF$0.65

EFFECT OF MEAN DEFLECTION ON THE LOW-CYCLE FLEXURAL FATIGUE BEHAVIOR OF ANNEALED 70-30 CUPRO-NICKEL.
Naval Ship Research and Development Center Annapolis Md Annapolis Div
For primary bibliographic entry see Field 11F.
AD-656 574 HC$3.00 MF$0.65

METALLURGICAL FAILURE ANALYSIS OF PM-3A REACTOR CONTROL ROD LIFTING KNOB.
Naval Research Lab Washington D C
For primary bibliographic entry see Field 18J.
AD-656 579 HC$3.00 MF$0.65

RAIL IMPACT TESTING ON LONG TRAVEL SHOCK MOUNTS, MODELS 230 AND 570.
Army Transportation Engineering Agency Fort Eustis Va
For primary bibliographic entry see Field 13F.
AD-656 600 HC$3.00 MF$0.65

BUCKLING OF VESSELS COMPOSED OF COMBINATIONS OF CYLINDRICAL AND SPHERICAL SHELLS.
Weidlinger (Paul) New York
For primary bibliographic entry see Field 13J.
AD-656 639 HC$3.00 MF$0.65

THERMOMECHANICAL COUPLING BEHAVIOR OF VISCOELASTIC RODS SUBJECTED TO CYCLIC LOADING.
Revised ed.,
California Univ San Diego La Jolla Dept of the Aerospace and Mechanical Engineering Sciences
N. C. Huang, and E. H. Lee. 29 Jul 66, 9p
AROD-5133.23-P
Contract DA-31-124-ARO (D)-257, ARPA Order-0570
Revision of manuscript submitted 6 Dec 65. Prepared in cooperation with Stanford Univ., Calif. Rept. on Proj: DEFENDER.
Availability: Published in Journal of Applied Mechanics p127-32 Mar 1967.

Descriptors: (*Rods, Loading (Mechanics)), Viscoelasticity, Oscillation, Boundary value problems, Iterative methods, Numerical analysis, Stresses, Frequency, Thermal properties, Rheology.
Identifiers: Defender project.

The problem of longitudinal oscillation of a viscoelastic rod of finite length including the effect of thermomechanical coupling was studied. The material is assumed to be thermorheologically simple. The almost steady oscillation superposed on a slowly varying temperature distribution permits representation as a boundary-value problem which is solved numerically by iterative procedures. Calculations are made for different stress levels and frequencies. It is found that the temperature increases considerably after a length of time of vibration although the stress level is low. A steady state of temperature can be reached if the temperature at one end of the rod is fixed and a radiation boundary condition is prescribed at the other end. (Author)
AD-656 658 Not available from CFSTI.

ON WILLEMS' EXPERIMENTAL VERIFICATION OF THE CRITICAL LOAD IN BECK'S PROBLEM,
California Univ San Diego La Jolla Dept of the Aerospace and Mechanical Engineering Sciences
N. C. Huang, W. Nachbar, and S. Nemat-Nasser. 6 Sep 66, 5p
AROD-5133.55
Contract DA-31-124-ARO (D)-257, ARPA Order-0570
Rept. on proj. DEFENDER.
Availability: Published in Journal of Applied Mechanics 3p 1967.

Descriptors: (*Loading (Mechanics), Cantilever beams), (*Vibration, *Failure (Mechanics)), Approximation (Mathematics), Mathematical analysis, Equations of motion, Boundary value problems, Dynamics, Buckling (Mechanics), Force (Mechanics).
Identifiers: Beck's problem.

In the experiment reported by N. Willems, the nonconservative tangential or follower force postulated for Beck's problem for the cantilever column was replaced by a conservative force system. The end force of magnitude P in Willems' experiment was so constrained that the line of action of the force during motion of the column passed through a fixed point at distance d below the loaded end of the column. For each load P, the value of d in Willems' experiment was so chosen that the fundamental circular frequency of free vibration w of the loaded column in Beck's problem was also one of the circular frequencies of free vibration for the Willems' configuration. Willems found experimentally that there existed a critical load on his configuration at which 'an induced vibration caused excessive amplitudes resulting in failure...' Although the highest measured critical load was 94 per cent of the theoretical load for the Beck problem, it was asserted that this discrepancy was due to the effects of approximations and experimental inaccuracies, and that, ideally, this experiment should yield the theoretical critical load for the Beck problem. It is shown in this Note that the last assertion is not correct. The Willems' configuration is an ingenious approximation that has a critical load close to the critical load for Beck's problem, but the two critical loads are not identical. The analytical proof is given. (Author)
AD-656 659 Not available from CFSTI.

SHORT-TIME APPROXIMATIONS IN NONLINEAR VISCOELASTICITY.
Revised ed.,
California Univ Berkeley Dept of Civil Engineering
J. Lubliner. 21 Nov 66, 11p
AROD-4547:12-E
Contract DA-31-124-ARO (D)-460
Revision of manuscript submitted 22 Aug 66.
Availability: Published in International Journal of Solids Structures v3 p513-20 1967.

Descriptors: (*Viscoelasticity, Approximation (Mathematics)), Nonlinear systems, Deformation, Propagation.

An approximation for nonlinear viscoelasticity over short time ranges is extended to include large deformations and simplified by the dropping of insignificant terms. An alternative approximation for short times is developed systematically as the counterpart to Coleman and Noll's approximation for slow deformations. This method is applied to the study of acceleration waves. (Author)
AD-656 668 Not available from CFSTI.

THE RESPONSE OF A CYLINDRICAL STRUCTURE TO A TURBULENT FLOW FIELD AT SUBCRITICAL REYNOLDS NUMBER,
Toronto Univ (Ontario) Inst for Aerospace Studies
For primary bibliographic entry see Field 20D.
AD-656 689 HC$3.00 MF$0.65

GRILLAGES UNDER NORMAL AND AXIAL LOADS - PRESENT STATUS,
Lehigh Univ Bethlehem Pa Fritz Engineering Lab
For primary bibliographic entry see Field 13J.
AD-656 725 HC$3.00 MF$0.65

FINITE DEFLECTIONS OF A SIMPLY SUPPORTED RIGID-PLASTIC CIRCULAR PLATE LOADED DYNAMICALLY,
Brown Univ Providence R I Div of Engineering
Norman Jones. May 67, 30p
Contract SD-86

Descriptors: (*Structural parts, Loading (Mechanics)), Deflection, Dynamics, Plasticity, Pressure, Deformation, Stresses, Strain (Mechanics), Bending.
Identifiers: Plates (Mechanical).

A theoretical analysis is presented for the dynamic behavior of a simply supported reigid, perfectly plastic circular plate subjected to a rectangular pressure pulse. It is shown that this theory, which considers the simultaneous influence of membrane forces and bending moments, predicts final deformations which are considerably smaller than those given by the corresponding bending theory of Hopkins and Prager even when maximum deflections only of the order of the plate thickness are permitted. It is believed that this theoretical analysis should assist in the interpretation of the dynamic biaxial stress-strain characteristics of materials recorded on diaphragms fitted in impact tubes and could be developed further in order to describe the behavior of plates having other support conditions and different dynamic loading characteristics. (Author)
AD-656 731 HC$3.00 MF$0.65

PLASTIC INSTABILITY IN RATE-DEPENDENT MATERIALS,
Brown Univ Providence R I Div of Engineering
J. D. Campbell. Jun 67, 28p
Contract SD-86

Descriptors: (*Creep, *Strain (Mechanics)), Stresses, Materials, Plasticity, Functional analysis, Stability, Tensile properties.
Identifiers: Superplasticity.

The paper presents a theoretical analysis of the time variation of strain gradients in a tensile specimen of rate-dependent material, the analysis being based on the assumption that the strain rate in the material is a function of the local values of stress and strain. The theory is used to determine the criterion for the growth of strain gradients, and it is shown that for a given material there exists a region of the stress-strain plane in which these gradients increase indefinitely with time. The theory is applied to materials with specific types of rate-dependence, and the results are related to experimental data obtained at constant rates of strain. (Author)
AD-656 732 HC$3.00 MF$0.65

CORRELATIONS BETWEEN FLEXURAL AND DIRECT STRESS LOW-CYCLE FATIGUE TESTS.
Naval Ship Research and Development Center Annapolis Md Annapolis Div
For primary bibliographic entry see Field 11F.
AD-656 746 HC$3.00 MF$0.65

STATIC AND DYNAMIC INSTABILITIES OF A PROPELLANT LINE,
Massachusetts Inst of Tech Cambridge Aeroelastic and Structures Research Lab
For primary bibliographic entry see Field 20D.
AD-656 752 HC$3.00 MF$0.65

PLANE SHOCK WAVES IN METALS AND HETEROGENEOUS MATERIALS.
Technical rept.,
Picatinny Arsenal, Dover, N. J. Feltman Research Labs.
James C. Pearson. Mar 67, 32p
PA-TR-3464

Descriptors: (*Shock waves, *Metals), Hydrodynamics, Stresses, Thermal properties, Hardening, Grain structures (Metallurgy), Diffusion, Geometry, Equations, Strain (Mechanics).

A reasonable model for the strength of a metal which has been shocked is given. Then the experiments and the equations necessary to determine the state of the metal behind a shock front, in terms of this model, are given. The difficulties inherent in predicting a metal's Hugoniot, and in predicting the work hardening produced in a metal by a plane shock wave and the following plane rarefaction wave, are discussed. For geometrically simple heterogeneous materials, the geometric dispersion produced in the shock zone is shown to be amenable to study with hydrodynamic codes. Therefore, it may be possible to determine the Hugoniots and

the adiabats of these simple heterogeneous materials numerically. (Author)
AD-811 215 HC$3.00 MF$0.65

PROJECTILE SIZE EFFECTS ON HYPERVELOCITY IMPACT CRATERS IN ALUMINUM.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
B. P. Denardo, C. R. Nysmith, and J. L. Summers. Jul 67, 14p NASA-TN-D-4067

Descriptors: *Aluminum, *Hypervelocity impact, *Particle size, *Projectile cratering, Cratering, Diameter, Hypervelocity, Impact, Momentum, Particle, Projectile, Shape, Size, Target, Transfer, Volume.

For abstract, see STAR 05 18.
N67-31538 HC$3.00 MF$0.65

EFFECT OF INITIAL LOADS AND OF MODERATELY ELEVATED TEMPERATURE ON THE ROOM-TEMPERATURE FATIGUE LIFE OF TI-8 AL-1 MO-1 V TITANIUM- ALLOY SHEET.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
L. A. Imig. Aug 67, 24p NASA-TN-D-4061

Descriptors: *Compression loading, *Fatigue life, *Notched metal, *Room temperature, *Temperature effect, *Titanium alloy, Alloy, Aluminum, Chemical, Composition, Compression, Effect, Elevation, Fatigue, Life, Loading, Metal, Molybdenum, Notch, Room, Stress, Temperature, Tensile, Titanium, Vanadium.

For abstract, see STAR 05 18.
N67-31539 HC$3.00 MF$0.65

JOINT ACCEPTANCE FOR CYLINDERS.
Wyle Labs., Inc., Huntsville, Ala. Testing Div.
A. R. Wenzel. Jun 67, 26p NASA-CR-85977, WR-67-9
Contract NAS8-5384

Descriptors: *Cylindrical shell, *Random vibration, *Thin walled shell, *Vibratory loading, Acceptance, Cylinder, Equation, Joint, Loading, Motion, Random, Response, Shell, Theory, Thin, Vibration.

For abstract, see STAR 05 18.
N67-31716 HC$3.00 MF$0.65

STUDY OF VIBRATIONS INDUCED IN THIN-WALLED PIPES UNDER VARYING FLOW CONDITIONS FINAL REPORT.
IIT Research Inst., Chicago, Ill. Fluid Dynamics Sect.
J. M. Clinch. Jun 67, 129p NASA-CR-86659
Contract NAS8-20325

Descriptors: *Turbulent flow, *Vibration measurement, Application, Cylinder, Excitation, Flow, Fluctuation, Induction, Internal, Measurement, Pipe, Prediction, Pressure, Response, Theory, Thin, Turbulent, Variation, Vibration, Wall, Water.

For abstract, see STAR 05 18.
N67-32116 HC$3.00 MF$0.65

EXPERIMENTAL INVESTIGATION OF THE TRANSONIC FLUTTER OF SIMPLE THIN TRUNCATED-CONE PANELS.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 20D.
For abstract, see STAR 05 18.
N67-32137 HC$3.00 MF$0.65

APPLICATION OF COMPUTER TECHNIQUES TO SOME PROBLEMS IN LINEAR VISCOELASTICITY.
Pennsylvania Univ., Philadelphia. School of Chemical Engineering.
W. C. Forsman, and J. W. Sell. 21 Jun 67, 126p NASA-CR-86982
Grant NSG-667

Descriptors: *Computer, *Molecular theory, *Viscoelasticity, Approximation, Coupling, Equation, Function, Linear, Loss, Molecular, Polymer, Relaxation, Spectrum, Theory.

For abstract, see STAR 05 18.
N67-32353 HC$3.00 MF$0.65

STRUCTURAL EFFICIENCY OF RING-STIFFENED CORRUGATED CYLINDERS IN AXIAL COMPRESSION.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
J. P. Peterson. Aug 67, 30p NASA-TN-D-4073
Contract 124-11-06-04-23

Descriptors: *Axial compression, *Buckling, *Corrugation, *Cylinder, *Reinforcement ring, *Stiff structure, Axial, Compression, Fatigue, Reinforcement, Ring, Stiffness, Structure.

For abstract, see STAR 05 18.
N67-32382 HC$3.00 MF$0.65

BEHAVIOR OF WELDED BUILT-UP BEAMS UNDER REPEATED FLEXURAL LOADS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 13M.
PB-175 519 HC$3.00 MF$0.65

LATERAL DISTRIBUTION OF DYNAMIC LOADS IN A PRESTRESSED CONCRETE BOX-BEAM BRIDGE DREHERSVILLE BRIDGE,
Lehigh Univ., Bethlehem, Pa. Fritz Engineering Lab.
For primary bibliographic entry see Field 13M.
PB-175 637 HC$3.00 MF$0.65

THE NONLINEAR MICROWAVE EFFECTS IN CONDUCTORS.
Utah Univ., Salt Lake City. Microwave Device and Physical Electronics Lab.
For primary bibliographic entry see Field 20N.
PB-175 689 HC$3.00 MF$0.65

WEIGHING HEAVY LOADS TO AN ACCURACY OF 0.001 PERCENT,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
For primary bibliographic entry see Field 14B.
For abstract, see NSA 21 15.
RFP-839 HC$3.00 MF$0.65

20L. Solid-State Physics

FOUNDATIONAL RESEARCH PROJECTS, JANUARY-MARCH 1967.
Quarterly rept.,
Naval Ordnance Lab Corona Calif
H. H. Caspers, C. F. Cook, G. E. Everett, T. Hadeishi, and S. A. Miller. 15 Jun 67, 88p Rept no. NOLC-715
See also AD-651 544.

Descriptors: (*Superconductors, Scientific research), (*Plasma physics, Scientific research), (*Semiconductors, Scientific research), (*Spectroscopy, Scientific research), Tunneling (Electronics), Photons, Microwave frequency, Plasma medium, Nuclear spins, Crystals, Phonons, Absorption, Neodymium, Ytterbium, Fluorescence, Absorption spectrum, Lanthanum compounds, Fluorides, Impurities.
Identifiers: Lanthanum fluoride.

Contents: Microwave photon interaction with superconducting tunneling currents; Phenomenon of spin exchange collisions between ions and neutral atoms in a plasma; Two-phonon matrix elements and absorption for crystal models with zinc blende structure, part III; Energy transfer between Nd (3+) and Yb (3+) in LaF3.
AD-655 889 HC$3.00 MF$0.65

THEORY OF PURE TYPE-II SUPERCONDUCTORS IN HIGH MAGNETIC FIELDS. II. ULTRASONIC ATTENUATION,
California Univ San Diego La Jolla Dept of Physics
For primary bibliographic entry see Field 20C.
AD-655 895 Not available from CFSTI.

HELICON MODES IN PURE TYPE-II SUPERCONDUCTORS IN THE HIGH-FIELD REGION,
California Univ San Diego La Jolla Dept of Physics
For primary bibliographic entry see Field 20C.
AD-655 952 Not available from CFSTI.

SPATIAL DISTRIBUTION OF EXCESS CARRIERS IN ELECTRON-BEAM EXCITED SEMICONDUCTORS,
University of Southern California Los Angeles
David F. Kyser, and David B. Wittry. 13 Mar 67, 4p
AFOSR-67-1657
Grant AF-AFOSR-76-66
Availability: Published in Proceedings of the IEEE v55 n5 p733-4 May 1967.

Descriptors: (*Carriers (Semiconductors), Band theory of solids), Transport properties, Gallium arsenides, Electron bombardment, Surface properties, Mathematical models.

The steady-state one-dimeasional carrier distribution in depth is computed for electron-beam excitation of semiconductors, including diffusion and surface recombination. An example is given for n-type GaAs bombarded by a 29-kV electron beam. (Author)
AD-655 956 Not available from CFSTI.

SCANDIUM TITANITE AND SCANDIUM VANADITE, ScTiO3 AND ScVO3,
Cornell Univ Ithaca N Y Materials Science Center
For primary bibliographic entry see Field 7B.
AD-655 960 Not available from CFSTI.

PROXIMITY EFFECT IN SUPERCONDUCTING CONTACTS BY ELECTRON TUNNELLING,
California Univ San Diego La Jolla Dept of Physics
For primary bibliographic entry see Field 20C.
AD-655 965 Not available from CFSTI.

SOLID-STATE AND MOLECULAR THEORY GROUP.
Quarterly progress rept. no. 65,
Massachusetts Inst of Tech Cambridge
J. C. Slater, P. D. DeCicco, J. B. Sokoloff, J. W. Gadzuk, and R. Gilmore. 15 Jul 67, 114p
Contract Nonr-1841 (34), Grant NSF-G24908
See also AD-651 911.

Descriptors: (*Solid state physics, Reviews), (*Molecular properties, Reviews), (*Magnetic materials, *Band theory of solids), (*Atomic energy levels, Wave functions), (*Crystal lattice defects, Interactions), Hartree-Fock approximation, Copper, Hamiltonian, Plasma medium, Relativity theory, Distribution functions, Quantum statistics, Field theory, Impurities, Moments.
Identifiers: Augmented plain wave method.

Contents: Lectures on the energy band theory of magnetism; Exchange in magnetic atoms; A note on the l-convergence of the APW method; Some primitive thoughts on localized moment structure in metals; Impurity screening in an inhomogeneous electron gas II. mass operator formalism: point impurity in the surface region; Field theory of an interacting electron gas in a periodic potential; The quantum origin and significance of Maxwell's equations.
AD-655 966 HC$3.00 MF$0.65

ANISOTROPY IN TUNNELING DENSITY OF STATES IN PURE TYPE-II SUPERCONDUCTORS,
California Univ San Diego La Jolla Dept of Physics
For primary bibliographic entry see Field 20C.
AD-655 968 Not available from CFSTI.

TWO-PHOTON ABSORPTION SPECTRUM OF CdS,
Rochester Univ N Y Inst of Optics
Paul J. Regensburger, and E. Panizza. 12 Dec 66, 3p
AFOSR-67-1728
Grant AF-AFOSR-236-65
Availability: Published in Physical Review Letters v18 n4 p113-4 Jan 23 1967.

Descriptors: (*Cadmium sulfides, Absorption spectrum), (*Photons, Absorption), Single crystals, Excitation, Coherent radiation, Probability, Electron transitions, Selection rules.

The two-photon absorption spectrum of single crystal cadmium sulfide was measured at liquid nitrogen temperature. Excitation to final states in the region 2.5 to 3.5 eV was achieved using a neodymium-glass laser and a tunable visible light source similar to that used by Frolich and Mahr in anthracene. The two-photon absorption spectrum begins at nearly the same energy as the one-photon absorption spectrum. The laser induced absorption was found to be linearly dependent on the laser and flashlamp intensity and of short duration indicating the simultaneous absorption of a laser and a visible photon. The cross section for two-photon absorption is found to be 2 X 10 to the -49th power cm to the 4th power sec, 2.7 times as long as that predicted by Braunstein and Ockman for allowed-allowed transitions. Possible transitions involved are discussed. (Author)
AD-655 971 Not available from CFSTI.

THE EQUIVALENT CIRCUIT MODEL IN SOLID-STATE ELECTRONICS. PART II. THE MULTIPLE ENERGY LEVEL IMPURITY CENTERS.
Revised ed.,
Illinois Univ Urbana Dept of Electrical Engineering
Chih-Tang Sah. 21 Feb 67, 16p
AFOSR-67-1708
Contract SD-131, Grant AF-AFOSR-714-67
Revision of manuscript submitted 23 Dec 66, See also AD-655 986.
Availability: Published in Proceedings of the IEEE v55 n5 p672-84 May 1967.

Descriptors: (*Semiconductors, *Band theory of solids), Models (Simulations), Impurities, Crystal lattice defects, Recombination reactions, Reaction kinetics, Gold, Doping, Silicon, Electrons, Carriers (Semiconductors), Atomic energy levels, Graphics, Solid state physics.

The equivalent circuit of a defect center with multiple energy levels in a semiconductor is formulated and applied to the calculation of the characteristics time constants of the multiple energy level system. Detailed numerical example of gold-doped silicon is given, including the constant characteristics time constant contour maps. The steady state charge distribution ratio and the recombination rate ratio diagrams are developed and applied to the numerical solutions of the steady state recombination and generation rate of electrons and holes in gold doped silicon. (Author)
AD-655 985 Not available from CFSTI.

THE EQUIVALENT CIRCUIT MODEL IN SOLID-STATE ELECTRONICS. PART I. THE SINGLE ENERGY LEVEL DEFECT CENTERS.
Revised ed.,
Illinois Univ Urbana Materials Research Lab
Chih-Tang Sah. 16 Feb 67, 21p
AFOSR-67-1650
Contract SD-131, Grant AF-AFOSR-714-67
Revision of manuscript submitted 13 Dec 66. See also AD-655 985.
Availability: Published in Proceedings of the IEEE v55 n5 p654-71 May 1967.

Descriptors: (*Semiconductors, *Band theory of solids), Models (Simulations), Graphics, Crystal lattice defects, Atomic energy levels, Solid state physics, Carriers (Semiconductors), Recombination reactions, Reaction kinetics, Electrons.

The equivalent circuit model is developed in this series of papers and applied to solid-state junction devices. In this paper, the exact equivalent circuit of a single level defect center in a semiconductor is developed based on the Shockley-Read-Hall model. It is then applied to the calculation of the steady state lifetimes of electrons and holes and to the transient decay time constants. The transient decay time constants are obtained for arbitrary nonequilibrium, but steady state, conditions are presented as a function of the steady state electron and hole concentrations by means of contour maps. The general criteria of trapping, recombination, and generation are also obtained using the single energy level defect center model which divides the carrier concentration plane into four quadrants centered at the equality carrier concentrations p* and n*. At this point, the four rates of electron or hole capture or emission at the defect center are equal and the four quadrants represent regions where recombination, generation, electron trapping or hole trapping dominates. (Author)
AD-655 986 Not available from CFSTI.

OPTICAL PROPERTIES OF ALPHA-MnS.
Doctoral thesis,
California Univ Riverside
Donald R. Huffman, and Robert L. Wild. 3 Nov 66, 10p
AFOSR-67-1753
Grant AF-AFOSR-523-64
Availability: Published in The Physical Review v156 n3 p989-97 Apr 15 1967.

Descriptors: (*Manganese compounds, Optical properties), (*Sulfides, Optical properties), Single crystals, Reflection, Spectroscopy, Absorption spectrum, Refractive index, Spectra (Infrared), Spectra (Visible + ultraviolet), Electron transitions, Dielectric properties, Band spectrum.
Identifiers: Manganous sulfide.

Optical characteristics of alpha-MnS were determined from 0.02 to 14 eV. Single crystals were used for measurements above 0.05 eV. The shift with temperature of the 6Al (g) to 4Al crystal-field splitting peak is shown to be reasonably attributed to the effect of magnetic ordering. A broad weak band near 1 eV may be either an impurity band or the unallowed transition Mn (3d (++)) to Mn (3d (+)). The absorption edge at 2.8 eV is explained as due to transitions from the wide S (2-) (3p) band to the narrow Mn (+) (3d) band. Two tiny peaks in the edge at 2.96 and 3.05 eV are suggested to be zero-phonon spin-orbit-split exciton peaks associated with this transition. High-energy absorption structure taken from Kramers-Kronig analysis of ultraviolet reflectance data are assumed to be associated with wide-band to wide-band transitions as in nonmagnetic compounds. A simple band diagram is suggested to explain the electronic transitions. The reststrahlen reflectance on a pressed powder was analyzed and the following parameters obtained: low- and high-frequency dielectric constants, 20 and 6.8; longitudinal and transverse optical mode frequencies, 320 and 185/cm. (Author)
AD-656 000 Not available from CFSTI.

THE CONDUCTION BANDS IN 6H AND 15R SILICON CARBIDE. I. HALL EFFECT AND INFRARED FARADAY ROTATION MEASUREMENTS.
Technical rept.,
Royal Aircraft Establishment Farnborough (England)
B. Ellis, and T. S. Moss. Dec 66, 22p Rept no. RAE-TR-66380

Descriptors: (*Silicon carbides, *Band theory of solids), Great Britain, Hall effect, Magneto-optic effect, Infrared phenomena.

Measurements of infra-red Faraday rotation and Hall effect were made in a number of specimens belonging to the 6H and 15R polytypes of silicon carbide. Within experimental error the Hall coefficient in these samples was found to be isotropic and it is concluded that the conduction band extrema in both polytypes are most probably located on the symmetry axis. For this model the Faraday rotation results give the effective mass appropriate to directions perpendicular to the axis of symmetry as 0.25 plus or minus 0.02 m sub o in the 6H polytype and 0.28 plus or minus 0.02 m sub o in the 15R polytype. Considerable care was required to ensure that the specimens used were uniform in carrier concentration and free from serious crystallographic faults; the precautions taken to meet these requirements and in particular the avoidance of one frequently occurring crystallographic imperfection are described in some detail. All the measurements were made at room temperature. (Author)
AD-656 008 HC$3.00 MF$0.65

INTERATOMIC POTENTIAL PARAMETERS OF SOLID NEON AND ARGON,
Rutgers - the State Univ New Brunswick N J Dept of Physics
J. S. Brown. 14 Jul 66, 7p
AFOSR-67-1781
Grant AF-AFOSR-726-65
Availability: Published in Proc Phys Soc v89 p987-92 1967.

Descriptors: (*Neon, Solidified gases), (*Argon, Solidified gases), (*Solidified gases, Molecular association), Crystal lattices, Free energy, Probability, Potential energy, Kinetic energy, Atomic properties.
Identifiers: Interatomic potentials.

Results are reported of calculations of the Lennard-Jones m-6 intermolecular potential parameters of solid neon and argon, including cubic and quartic contributions to the lattice free energy at 0K. (Author)
AD-656 009 Not available from CFSTI.

ANHARMONIC CONTRIBUTION TO THE GRUNEISEN PARAMETERS OF SOLID ARGON, KRYPTON AND XENON,
Rutgers - the State Univ New Brunswick N J Dept of Physics
C. Feldman, J. L. Feldman, G. K. Horton, and M. L. Klein. 10 Jan 67, 5p
AFOSR-67-1651
Grant AF-AFOSR-726-65
Prepared in cooperation with Grumman Aircraft Engineering Corp., New York, N. Y.; Rensselaer Polytechnic Inst., Troy, N. Y., Dept. of Physics; King's Coll., London (England), Dept. of Physics; and Bristol Univ. (England), Dept. of Theoretical Chemistry.
Availability: Published in Proc Phys Soc v90 1182-5 1967.

Descriptors: (*Argon, Solidified gases), (*Krypton, Solidified gases), (*Xenon, Solidified gases), (*Solidified gases, Equations of state), Free energy, Thermal expansion, Compressive properties, Specific heat, Crystal lattices, Molecular association, Potential energy, Great Britain.
Identifiers: Gruneisen parameters, Interatomic potentials.

Recent calculations of the anharmonic contribution to the Helmholtz energy of a face-centred cubic lattice with arbitrary nearest-neighbour central forces are used to estimate possible anharmonic contributions to the thermodynamic Gruneisen parameters of solid argon, Krypton and xenon. For a Lennard-Jones 12-6 potential the anharmonic contribution to the Gruneisen parameter gamma is found to be large and such that gamma (Xe) > gamma (Kr) > gamma (Ar). The calculations also suggest that for these solids gamma (T) should be quite rapidly decreasing well before the melting point. (Author)
AD-656 010 Not available from CFSTI.

MODEL POTENTIALS AND THE DISPERSION LAW IN SOLID KRYPTON,
Rutgers - the State Univ New Brunswick N J Dept of Physics
J. S. Brown, and G. K. Horton. 6 Mar 67, 4p
AFOSR-67-1783
Grant AF-AFOSR-726-65
Availability: Published in Physical Review Letters v18 n16 p647-9 Apr 17 1967.

Descriptors: (*Krypton, Solidified gases), (*Solidified gases, Molecular association), (*Phonons, Solidified gases), Transport properties, Potential energy, Equations of state, Crystal lattices.
Identifiers: Interatomic potentials.

Daniels, et al., (Phys. Rev. Letters v18 p548 1967) have measured the dispersion of phonons in solid krypton at 300 bar and 79K along the 3 principle symmetry directions. Calculations of the dispersion law using the Lennard-Jones potentials now show that an M-13 all-neighbor and an M-14 first-neighbor potential is compatible with their data.
AD-656 011 Not available from CFSTI.

ELECTRODELESS DETERMINATION OF SEMICONDUCTOR CONDUCTIVITY FROM TE01-MODE REFLECTIVITY,
Minnesota Univ Minneapolis Dept of Mathematics
For primary bibliographic entry see Field 20C.
AD-656 014 Not available from CFSTI.

ELECTRON AND PHONON EFFECTS IN SUPERCONDUCTING FCC LEAD-BASED ALLOYS,
Western Reserve Univ Cleveland Ohio
J. G. Adler, J. E. Jackson, and T. A. Will. 4 Mar 67, 5p
AFOSR-67-1773
Grant AF-AFOSR-565-66
Prepared in cooperation with Case Inst. of Tech.
Availability: Published in Physics Letters v24A n8 p407-9 Apr 10 1967.

Descriptors: (*Lead alloys, *Superconductors), Electrons, Tunneling (Electronics), Bismuth, Thallium, Indium, Phonons, Tables, Measurement.

Electron tunneling measurements have been carried out in fcc lead-based alloys over a wide range of electron-phonon coupling strengths. (Author)
AD-656 019 Not available from CFSTI.

EXCITON STRUCTURE AND MAGNETO-OPTICAL EFFECTS IN ZnS.
Revised ed.,
Yale Univ New Haven Conn
John C. Miklosz, and Robert G. Wheeler. 20 Jul 66, 13p
AFOSR-67-1782
Grant AF-AFOSR-873-65
Revision of manuscript submitted 11 Jun 65.
Availability: Published in The Physical Review v153 n3 p913-23 Jan 15 1967.

Descriptors: (*Zinc sulfides, *Excitons), (*Magneto-optic effect, Zinc sulfides), Absorption spectrum, Reflection, Band theory of solids, Carriers (Semiconductors), Atomic energy levels, Selection rules.

The exciton structure in hexagonal ZnS was studied in transmission and interpreted in terms of an effective-mass formalism. The n1=1,2,3,4, and 5 states of the first (gamma 7 - gamma 9) series, and the n2=1,2, and 3 states of the second (gamma 7 - gamma 7) series were observed and identified. From the series limits, a band gap of 31,543/cm and a crystal-field splitting of approx. 240/cm have been measured. Using a semiempirical theory of exciton structure to interpret the behavior of the excited states in the presence of an external magnetic field, band parameters for the gamma 7 conduction band and the gamma 9 valence band were obtained. The isotropic electron effective mass was found to be me=0.28 plus or minus 0.03, and the anisotropic hole mass to be mhx=0.49 plus or minus 0.06, mhz=1.4, where me and mh are expressed in terms of the free-electron mass. In addition, the conduction-band electron was found to have a g value approximately equal to 2. The most interesting feature of the exciton spectra is that interpretation of the first-series excited states requires the assignment of so-called forbidden symmetry. It is shown that the occurrence of very strong forbidden transitions in ZnS is in line with the trend exhibited by the exciton spectra of CdSe and CdS. (Author)
AD-656 023 Not available from CFSTI.

CONSOLIDATED SEMIANNUAL PROGRESS REPORT.
Rept. no. 5, 1 Oct 66-31 Mar 67.
University of Southern California Los Angeles Electronic Sciences Lab
Mar 67, 224p
See also AD-625 471.

Descriptors: (*Solid state physics, Scientific research), Semiconductors, Field theory, Electromagnetic waves, Single crystals, Information theory, Plasma physics, Mass spectroscopy, Superconductivity, Magnetism, Communication systems, Digital computers, Neuromuscular transmission, Control systems, Theory, Scattering, Instrumentation, Bionics.

Contents: Semiconductors; Quantum electronics; Magnetism; Crystals; Superconductivity; Metals; Applied electromagnetics and plasmas; Information sciences; Control systems; Communication systems; Hybrid and digital computation; Biological engineering. (Author)
AD-656 025 HC$3.00 MF$0.65

DISPERSION ENERGY AND ELECTRONIC CORRELATION IN MOLECULAR CRYSTALS. COHESIVE ENERGY OF SOLID NEON,
Uppsala Univ (Sweden) Quantum Chemistry Group
Jan Linderberg, and Fred W. Bystrand. 15 Mar 64, 44p
Contract AF 61 (052)-701
Availability: Published in Arkiv fuer Fysik v26 n22 p323-39 Feb 12 1964; Arkiv fuer Fysik v26 n26 p383-95 Feb 26 1964.

Descriptors: (*Crystals, *Molecular association), (*Solidified gases, Molecular association), (*Neon, Solidified gases), Atomic energy levels, Ground state, Integral equations, Atomic orbitals, Excitons, Dielectric properties, Hartree-Fock approximation, Interactions, Scattering, Sweden.
Identifiers: Cohesion.

Quantitative investigations of the cohesive energies of molecular solids are subject to many sources of errors, and it is the purpose of the first paper to analyze the various energy contributions and to suggest methods whereby the most significant ones can be evaluated. Effects arising from the coordination of electronic motions are considered in particular and are shown to lead to general dispersion energies of London's type. The theoretical development gives results relevant to the theory of exciton states and to the dielectric properties of condensed matter. Appraisals of contributions to the cohesive energy of solid crystalline neon are presented in the second paper. The energy can be thought of as consisting of three parts, viz. one which is called Hartree-Fock energy, another being the correlation energy, and the third being associated with the nuclear motion. The first is calculated in the tight-binding approximation, the second from many-electron theory, and the third is taken from other sources.
AD-656 037 Not available from CFSTI.

CORRELATION EFFECTS IN THE BAND STRUCTURE OF GRAPHITE,
Uppsala Univ (Sweden) Quantum Chemistry Group
Jan Linderberg, and Kalle V. Makila. 1 Mar 67, 15p Rept no. Scientific-29
Contract AF 61 (052)-874
Prepared in cooperation with Aarhus Univ. (Denmark), Dept. of Chemistry.
Availability: Published in Unidentified journal.

Descriptors: (*Graphite, *Band theory of solids), Crystal lattices, Transport properties, Carriers (Semiconductors), Molecular orbitals, Sweden, Denmark.

Dynamical electronic correlation is investigated for graphite layers in a tight-binding model suggested by Hubbard. Changes in the density of states are small but the damping of quasiparticle states is considerable. (Author)
AD-656 039 Not available from CFSTI.

IONIC THERMOCURRENTS IN ALKALI HALIDE CRYSTALS CONTAINING SUBSTITUTIONAL BERYLLIUM IONS.
Technical rept.,
Pennsylvania Univ Philadelphia Dept of Physiology
Cesare Bucci. Jul 67, 30p Rept no. TR-8
Contract Nonr-551 (28)

Descriptors: (*Crystal lattice defects, Beryllium), (*Alkali metal compounds, Transport properties), (*Beryllium, Transport properties), Halides, Impurities, Dielectric properties, Ionic current, Relaxation time, Diffusion, Heat of activation, Dipole moments, Sodium chloride, Potassium compounds, Chlorides.
Identifiers: Potassium chloride.

The dielectric relaxations of NaCl and KCl single crystals containing beryllium ions were studied by using the technique of the ionic thermocurrents (ITC) in the range of temperatures between 1.2K and 300K. The ITC spectra are characterized by three types of relaxations in both host crystals. The analysis of such relaxations and the observed temperature dependence of their relaxation times indicate that: (1) the beryllium ions are, for a large fraction, associated with cation vacancies that occupy nearest neighbor (n.n) positions as well as next nearest neighbor (n.n.n) positions with respect to the impurity; (2) the relaxation rates with which the Be-vacancy dipoles change their orientation under the influence of an electric field are dominated by the frequency of direct interchange between Be and vacancy (omega-2) and by the frequency of jump between (n.n.) and (n.n.n.) positions (omega-3 and omega-4); (3) the activation

energy for the diffusion of Be ions is .5 eV for NaCl and .45 eV for KCl. In discussing the results, the possibility that the Be ions occupy off-center positions is considered. (Author)
AD-656 087 HC$3.00 MF$0.65

QUANTUM LIMIT GALVANOMAGNETIC PHENOMENA IN n-InSb,
Massachusetts Inst of Tech Cambridge National Magnet Lab
O. Beckman, E. Hanamura, and L. J. Neuringer.
20 Mar 67, 4p
AFOSR-67-1677
Contract F44620-67-C-0047
Availability: Published in Physical Review Letters v18 n19 p773-5 May 8 1967.

Descriptors: (*Indium antimonides, Transport properties), Hall effect, Magnetic fields, Measurement, Band theory of solids, Carriers (Semiconductors), Cryogenics, Scattering.
Identifiers: Magnetoresistive effect, Galvanomagnetic effect.

The binding energy of magnetically induced bound states has been measured in n-InSb subjected to intense magnetic fields and found to be in agreement with theoretical predictions. Observations of quantum-limit scattering and impurity conduction are discussed. (Author)
AD-656 121 Not available from CFSTI.

CRYSTALLIZATION OF Fe (NH4)26H2O ON A SEED IN MAGNETIC FIELDS UP TO 140 kOe,
Massachusetts Inst of Tech Cambridge National Magnet Lab
M. M. Schieber. 17 Oct 66, 5p
AFOSR-67-1729
Contract F44620-67-C-0047
Availability: Published in Solid State Communications v5 p383-5 1967.

Descriptors: (*Crystal growth, *Iron compounds), (*Magnetic fields, *Ammonium compounds), (*Sulfates, Crystal growth), Crystallization, Thermal properties, Crystallography, Thermistors, Equilibrium, Thermodynamics.

The present communication reports isothermal crystal growth experiments in high magnetic fields. We find that both the isothermal linear velocity of growth or dissolution R of a seed of Fe (NH4)2 (SO4)2 . 6H2O is increased when a magnetic field H is applied. The magnitude of the increase in R for growth at H = 83 kOe is equivalent to the increase in R obtained by a decrease in temperature of 1K. The total temperature fluctuation in the experiments is plus or minus 0.05K. The direction of maximum growth is at an angle of 40-60 degrees relative to H. No satisfactory quantitative model has yet been developed to explain the new experimental data. (Author)
AD-656 123 Not available from CFSTI.

USE OF OPW WAVE FUNCTIONS FOR INTERBAND ABSORPTION IN THE ALKALIS,
Pennsylvania State Univ University Park Dept of Physics
N. M. Miskovsky, and P. H. Cutler. 21 Apr 67, 5p
AFOSR-67-1719
Grant AF-AFOSR-213-66
Availability: Published in Physics Letters v24A n11 p611-3 May 22 1967.

Descriptors: (*Alkali metals, Absorption spectrum), (*Absorption spectrum, *Wave functions), Band theory of solids, Excitation, Numerical analysis.
Identifiers: Orthogonalized-plane-wave theory.

Calculations using OPW's lead to conclusions regarding the importance of choice of wave functions in interband absorption in the alkalis. (Author)
AD-656 127 Not available from CFSTI.

RAMAN SCATTERING BY COLOR CENTERS,
Milan Univ (Italy) Istituto Di Fisica
G. Benedek, and G. F. Nardelli. 15 Aug 66, 6p
AFOSR-67-1761
Grant AF-EOAR-5-65
Availability: Published in The Physical Review v154 n3 p872-6 Feb 15 1967.

Descriptors: (*Color centers, *Raman spectroscopy), Crystal lattice defects, Electron transitions, Alkali metal compounds, Halides, Sodium chloride, Potassium compounds, Chlorides, Absorption spectrum, Italy.
Identifiers: Potassium chloride.

It is pointed out that the Raman spectrum of a color center gives significant information on the vibration spectrum associated with an electronic transition of the center itself. The formal theory of the first-order Raman scattering by substitutional defects in alkali halides is developed in detail. The coupling coefficients according to which the irreducible representations of the perturbed normal modes enter the total Raman spectrum are shown to be simply related to the stress coefficients of the absorption band. Calculations on the first-order Raman spectra F centers in NaCl and KCl are found to be in fairly good agreement with experimental data recently obtained. An application of the present method to the theory of local-mode sidebands is also outlined. (Author)
AD-656 146 Not available from CFSTI.

PHONON COUPLING IN EDGE EMISSION AND PHOTOCONDUCTIVITY OF CdSe, CdS, AND Cd (Se sub x S sub 1-x),
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
D. W. Langer, Y. S. Park, and R. N. Euwema. 11 Jul 66, 12p Rept no. ARL-67-0032
Availability: Published in The Physical Review v152 n2 p788-96 Dec 9 1966.

Descriptors: (*Semiconductors, *Phonons), (*Cadmium selenides, Transport properties), (*Cadmium sulfides, Transport properties), Continuous spectrum, Emissivity, Photoconductivity, Crystal lattices, Crystal lattice defects, Band theory of solids, Carriers (Semiconductors).
Identifiers: Cadmium sulfoselenides.

In mixtures of Cd (Se sub x S sub 1-x) two longitudinal optical (LO) phonons (and their additive combinations) couple to the edge emission centers and to the conduction electrons. The phonon frequencies as a function of the CdSe/CdS ratio--which are observed in the edge emission spectra--agree well with the eigenfrequencies calculated for a linear chain of Cd-Se-Cd-S-Cd-...atoms. The spectral response of the photoconductivity of pure CdS and CdSe shows oscillations at the high-energy side of the absorption edge. The energy separation between successive photocurrent maxima or minima corresponds approximately to the LO phonon energy of each crystal lattice. The minima are explained by a shortened electron lifetime at the respective energies, because electrons having such energies may easily drop to a recombination center (exciton or impurity near band edge) by the emission of one or several LO phonons. It is shown that in mixed crystals the two LO phonons (and their combinations) shorten the lifetime of the conduction electrons. Thus, when excitation occurs via the conduction band, the recombination center will be populated faster in mixed crystals than in pure crystals. Hurwitz's observation, namely, that the lasing threshold in Cd (SeS) mixtures is lower than that of either CdSe or CdS, might therefore be accounted for. (Author)
AD-656 151 Not available from CFSTI.

DIFFUSION MEASUREMENTS INVOLVING DISCONTINUOUS INTERFACIAL CONTACT,
Aerospace Research Labs Wright-Patterson AFB Ohio
K. J. Richards, and K. R. Cramer. 23 Jan 67, 8p
Rept no. ARL-67-0078
Availability: Published in Physica Status Solidi v20 pK2103 1967.

Descriptors: (*Diffusion, Experimental design), (*Tracer studies, Diffusion), Interfaces, Geometric forms, Surface properties, Concentration (Chemistry), Films, Equations.

It is shown that any experimental technique that averages the concentration in the plane perpendicular to the diffusion direction may be evaluated in terms of the simple one-dimensional solutions of Fick's laws with proper corrections for the true interfacial contact area. For example, the constant surface concentration and vanishingly thin film methods of studying diffusion can be used to measure the diffusion coefficient even though the surface is of nonuniform accessibility or the thin layer is not continuous.
AD-656 153 Not available from CFSTI.

ENERGY BAND STRUCTURE OF CdS USING SELF-CONSISTENT OPW AND PSEUDOPOTENTIAL METHODS,
Aerospace Research Labs Wright-Patterson AFB Ohio
T. C. Collins, R. N. Euwema, and J. S. DeWitt.
1966, 9p Rept no. ARL-67-0081
Proceedings of the International Conference on the Physics Semiconductors, Kyoto.
Availability: Published in Journal of the Physical Society of Japan v21 p15-9 1966.

Descriptors: (*Cadmium sulfides, *Band theory of solids), Brillouin zones, Electron density, Atomic energy levels, Potential energy.
Identifiers: Orthogonalized-plane-wave theory.

A OPW calculation of the six symmetry points of the Wurtzite Brillouin zone of CdS has been performed by using (electron density) to the 1/3 power as the exchange potential. A maximum of approx. 250 plane waves are used which gives approx. 25 to 50 symmetry adapted OPW's for each of the different representations of the zone point groups. Further, the band structure is obtained by the use of the Pseudopotential Method, with the form factors obtained from experimental values of the splitting of the energy levels as well as calculated values of the OPW method. Also, the effective masses of the conduction and valence bands are computed. (Author)
AD-656 154 Not available from CFSTI.

ELECTRICAL PROPERTIES AND DEFECT STRUCTURE OF A (0.13 YO1.5 . 0.87 ThO2) ELECTROLYTE.
Aerospace Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 11B.
AD-656 185 Not available from CFSTI.

CALCULATION OF ELASTIC CONSTANTS OF NaF,
Uppsala Univ (Sweden) Inst of Physics
For primary bibliographic entry see Field 20B.
AD-656 363 Not available from CFSTI.

PHOTOEMISSION STUDY OF THE ELECTRONIC STRUCTURE OF CdTe.
Revised ed.,
Lockheed Missiles and Space Co Palo Alto Calif Lockheed Palo Alto Research Lab
Joseph L. Shay, William E. Spicer, and Frank Herman. 14 Mar 67, 10p Rept no. Scientific-2
AFCRL-67-0405
Contract AF 19 (628)-5750
Prepared in cooperation with Stanford Univ., Calif. Stanford Electronics Labs. Revision of manuscript submitted 14 Oct 66.
Availability: Published in Physical Review Letters v18 n16 p649-54 Apr 17 1967.

Descriptors: (*Semiconductors, Photoelectric effect), (*Cadmium compounds, Band theory of solids), (*Tellurides, Band theory of solids), (*Photoelectric effect, *Band theory of solids), Spectroscopy, Reflection, Electron transitions, Atomic orbitals.
Identifiers: Cadmium telluride, Orthogonalized-plane-wave theory.

Cardona and Greenaway's identifications of the Eo', E1', and E1' + delta-1 peaks in the optical reflectivity spectrum of CdTe are contradicted by deductions drawn from photoemission measurements. New identifications of these peaks are proposed on the basis of these photoemission measurements and the results of empirically adjusted orthogonalized-plane-wave energy band calculations. This theoretical band model for CdTe differs in some important respects from that derived by Cohen and Bergstresser using the empirical pseudopotential method. (Author)
AD-656 365 Not available from CFSTI.

HEAT CAPACITY OF Mn (HCOO)2.2H2O BETWEEN 1.4 AND 20K.
Technical rept.,
Carnegie Inst of Tech Pittsburgh Pa Dept of Physics
R. D. Pierce, and S. A. Friedberg. 1 Aug 67, 40p Rept no. TR-8
Contract Nonr-760 (26)
Availability: Published in Unidentified journal.

Descriptors: (*Manganese compounds, Specific heat), (*Formates, Specific heat), (*Magnetic materials, Thermal properties), Nuclear spins, Transition temperature, Entropy, Magnetic moments, Crystal structure, Antiferromagnetism, Cryogenics, Nuclear magnetic resonance.
Identifiers: Heat capacity, Manganese formate.

The heat capacity of Mn (HCOO)2.2H2O was measured between 1.4 and 20K. Sharp peaks associated with long-range spin ordering are found at 3.72K and 1.72K. These anomalies can be correlated with corresponding effects in the magnetic and resonance properties of the salt. The present thermal data account for less than half the expected R ln 6 of magnetic entropy, with little contribution expected above 20K, suggesting that half the manganese moments remain highly disordered at 1.4K. The response of the heat capacity to external magnetic fields supports this conclusion. A unit cell of Mn (HCOO)2.2H2O contains two each of two inequivalent Mn (+2) sites, types A and B. Formate groups constitute AA and AB bridges and appear to mediate the dominant superexchange couplings. A simplified molecular field treatment of Mn (HCOO)2.2H2O using these parameters provides interpretations of several striking effects. In particular, it shows that below a common transition temperature, B spins order much more slowly than A spins and are nearly 'free' at 1K as seen in both magnetic and thermal data. The model also predicts anomalous behavior below 1K as a consequence of a sharp temperature dependence of the B spin order parameter at very low temperature. (Author)
AD-656 400 Not available from CFSTI.

INTERBAND DIELECTRIC PROPERTIES OF SOLIDS IN AN ELECTRIC FIELD.
Technical rept.,
Brown Univ Providence R I Dept of Physics
D. E. Aspnes, Paul Handler, and D. F. Blossey. Aug 67, 47p
AROD-6412:5-P
Contract DA-31-124-ARO (D)-454
Prepared in cooperation with Illinois Univ., Urbana. Dept. of Physics.

Descriptors: (*Band theory of solids, *Dielectric properties), Electric fields, Transport properties, Modulation, Brillouin zones, Special functions (Mathematical), Dipole moments, Integrals.

A general expression for the imaginary part of the one-electron interband dielectric function of a solid in the presence of an electric field is derived. The result is valid for all regions of k-space and explicitly takes into account the variation of the dipole matrix element and effective mass throughout the Brillouin zone. Under certain approximations the finite electric field dielectric function reduces to the convolution of the zero field dielectric function with an Airy function. This result can be used in conjunction with band structure calculations which have already been done in order to predict the line shape of the electroreflectance spectra as a function of electric field. The convolution expression reduces further at non-degenerate critical points, and the forms for the four types of critical points are presented. In certain instances it is possible to unfold the convolution integral and obtain the zero field dielectric function from either the finite field dielectric constant or the electroreflectance data at isolated critical points. (Author)
AD-656 469 HC$3.00 MF$0.65

CRYSTAL STRUCTURES, THEIR DEFECTS AND TRANSFORMATIONS.
Chicago Univ Ill
For primary bibliographic entry see Field 20B.
AD-656 527 HC$3.00 MF$0.65

SOLID STATE RESEARCH, 1967-2.
Quarterly technical summary rept. 1 Feb-30 Apr 67,
Massachusetts Inst of Tech Lexington Lincoln Lab
Alan L. McWhorter. 15 May 67, 69p
ESD-TR-67-266
Contract AF 19 (628)-5167
See also AD-651 065.

Descriptors: (*Solid state physics, Reviews), (*Lasers, Solid state physics), (*Materials, Solid state physics), (*Semiconductor devices, Solid state physics), Semiconductors, Infrared detectors, Electroluminescence, Crystal growth, Band theory of solids, Neutron diffraction analysis, Magnetism, Magneto-optic effect, Phase studies, Physical properties.
Identifiers: Semiconductor junctions.

The report covers in detail the solid state research work at Lincoln Laboratory for the period 1 February through 30 April 1967. The topics covered are Solid State Device Research, Optical Techniques and Devices, Materials Research, and Physics of Solids. (Author)
AD-656 548 HC$3.00 MF$0.65

THE EFFECT OF PRESSURE ON OPTICAL ABSORPTION, RECOMBINATION RADIATION, AND RESISTIVITY OF GaSb.
Technical rept.,
Harvard Univ Cambridge Mass Div of Engineering and Applied Physics
Bernard Brooks Kosicki. Jun 67, 163p Rept no. HP-19
Contract Nonr-1866 (10)

Descriptors: (*Semiconductors, Absorption), (*Optical properties, Semiconductors), Pressure, Resistance (Electrical), Gallium compounds, Antimony compounds, Electroluminescence, Impurities, Doping, Electrons, Crystallography, Measurement, Electron spin resonance, Diodes, Hydrostatic pressure, Tables.

The report described measurements of the effect of pressure on optical absorption, electroluminescence, photoluminescence and resistivity of GaSb. These measurements provide experimental values for two parameters of the GaSb energy band structure (pressure coefficient of the direct energy gap, and spin orbit splitting in the valence band at k = 0), and are analyzed to give information about Te, Se, and S donor impurity levels in GaSb. The effect of pressure on the resistivity of the n-type samples was measured; the observed increases in resistivity were much larger (especially in Se doped GaSb) than predicted by the increase in ionization energy of the Gamma 1 level mentioned above. Therefore, the presence of a second impurity level associated with the subsidiary L1 conduction band minima was invoked, and it was then possible to explain the observed increase in resistivity. From this and similar resistivity experiments on n-type GaSb the following impurity levels have been identified: Se and Te levels associated with the L1 conduction band minima, and Se and S levels associated with X1 conduction band minima. In each case, the apparent pressure coefficient of an impurity level was used to identify it with either the L1 or X1 conduction band. (Author)
AD-656 590 HC$3.00 MF$0.65

THE OPTICAL ABSORPTION EDGE IN THE LEAD SALTS AND ITS VARIATION WITH TEMPERATURE AND PRESSURE.
Technical rept.,
Harvard Univ Cambridge Mass Div of Engineering and Applied Physics
Vidyut Prakash. Jun 67, 278p Rept no. HP-13
Contract Nonr-1866 (10)

Descriptors: (*Optical properties, *Semiconductors), (*Lead compounds, *Absorption), Hydrostatic pressure, Thermal properties, Refractive index, Crystal structure, Electrons, Temperature, Energy, Hysteresis, Epitaxial growth, Photoconductivity, Diodes (Semiconductor), Valence, Deformation, Reflectivity, Measurement.

This report contains: a review of experimental and theoretical investigations of the band structure of the lead salts; a report of new measurements of the shift of the optical absorption edge in PbS, PbSe, and PbTe with hydrostatic pressure, and of the edge in PbS with temperature; a study of the shape of the absorption edge and its variation with temperature and pressure, particularly in PbS; and a study of the shape of the refractive index curve n (hv) near the absorption edge in PbS, and the shift of n (hv) with pressure and temperature. (Author)
AD-656 591 HC$3.00 MF$0.65

INFLUENCE OF CHARGE COMPENSATION ON UV-EXCITATION OF RARE-EARTH FLUORESCENCE,
Harry Diamond Labs Washington D C
Walter Viehmann. May 67, 28p Rept no. HDL-TR-1350

Descriptors: (*Rare earth elements, *Fluorescence), (*Terbium, Fluorescence), (*Europium, Fluorescence), (*Dysprosium, Fluorescence), Calcium compounds, Strontium compounds, Lead compounds, Cadmium compounds, Tungstates, Molybdates, Fluorides, Calcium fluorides, Excitation, Ultraviolet radiation, Atomic energy levels, Lasers, Materials.

Excitation spectra for the fluorescence transitions of Tb (3+), Eu (3+), and Dy (3+) were obtained at room temperature on single crystals of the tungstates and molybdates of Ca, Sr, Pb, and Cd, having the Scheelite structure, and on terbium-doped crystals of CaF2 and SrF2. Rare-earth concentrations were nominally one atomic percent and charge compensation was provided by vacancy formation or interstitials, by substitution in cationsites or by anionic substitutions. Strong UV-excitation bands were found for Tb- and Eu-doped crystals and weaker bands for Dy-doped matrices. The bands generally occur near the host-lattice absorption-edge but their intensities and energy positions are strongly influenced by the charge-compensating defects near the active ion. The long wavelength peaks of the bands occur at energies coinciding with 4f-level positions of the rare-earth

ions, suggesting a strong perturbation of 4f-levels by charge transfer states. The short-wavelength regions of the excitation bands are ascribed to exchange transfer from UV-absorbing groups. (Author)
AD-656 599 HC$3.00 MF$0.65

RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Columbia Radiation Lab New York
For primary bibliographic entry see Field 9C.
AD-656 618 HC$3.00 MF$0.65

NOISE IN DOUBLE-INJECTION SPACE-CHARGE-LIMITED DIODES.
Minnesota Univ Minneapolis Dept of Electrical Engineering
For primary bibliographic entry see Field 9A.
AD-656 663 Not available from CFSTI.

MECHANISM FOR REVERSE-BIASED BREAKDOWN RADIATION IN P-N JUNCTIONS.
Revised ed.,
Brown Univ Providence R I Div of Engineering
J. Shewchun, and L. Y. Wei. 18 Nov 64, 10p
Revision of manuscript submitted 2 Oct 64. Prepared in cooperation with Waterloo Univ. (Ontario).
Availability: Published in Solid-State Electronics, v8 p485-93 1965.

Descriptors: (*Semiconductors, Bremsstrahlung), Gallium arsenides, Germanium, Silicon, Diodes (Semiconductor), Silicon carbides, Gallium compounds, Light, Band theory of solids, Photoelectric effect, Carriers (Semiconductors), Electric fields.
Identifiers: Semiconductor junctions, Breakdown radiation (Semiconductors).

The origin of reverse-biased breakdown radiation in germanium and silicon p-n junctions has not been definitely established. This radiation was first reported by Newman for silicon p-n junctions and somewhat later by Kikuchi and Tachikawa for germanium p-n junctions, and has a visible 'spotted' spatial distribution. It has usually been assumed that this radiation originates from recombination occurring between energetic electrons and holes in microplasmas. The measured spectral distributions of the radiation from silicon and germanium junctions are quite different, with the silicon emission spectrum showing no structure, whereas the germanium one does. Existing explanations, including intraband transitions, do not adequately account for the presence or lack of structure. A more recent proposal by Figielski and Torun that the radiation is from the bremsstrahlung of hot carriers in the coulomb field of charged centres is extended to include a more suitable high field distribution function due to Yamashita and Inoue. It is found that the spectral distribution of the radiation should be of the form U sub nu is proportional to (1-erf (hnu/ (the square root of 2p)k T sub e)), where T sub e is the electron temperature, and p is a factor depending on mobility, electric field, and the velocity of sound. (Author)
AD-656 672 Not available from CFSTI.

STRUCTURE, CONDUCTIVITY AND HALL EFFECT OF ELECTRON BOMBARDMENT EVAPORATED SILICON FILMS ON SAPPHIRE.
Revised ed.,
British Columbia Univ Vancouver Dept of Electrical Engineering
C. A. T. Salama, T. W. Tucker, and L. Young. 14 Nov 66, 15p
Revision of manuscript submitted 4 Oct 66.
Availability: Published in Solid State Electronics v10 p339-51 1967.

Descriptors: (*Semiconducting films, Silicon), (*Silicon, *Epitaxial growth), Substrates, Sapphires, Electron bombardment, Vapor plating, Single crystals, Electron diffraction analysis, Crystal structure, Hall effect, Electrical conductance, Crystal lattice defects, Doping, Aluminum, Band spectrum, Canada.

Silicon films about 1-micron thick were deposited on sapphire substrates in a vacuum of about 0.0000001 mm Hg by electron bombardment evaporation. The sapphire substrates were also heated by electron bombardment. With a substrate temperature of 950C, films deposited on sapphire cut perpendicularly to the optic axis gave essentially single crystal electron diffraction patterns. The epitaxy was less good with sapphire cut perpendicularly to the sapphire growth axis. Because of re-evaporation, no film was deposited if the substrate temperature was above about 1100C. At 850C the films were composed of small, almost randomly oriented grains. Measurement of conductivity and Hall effect over a range of temperature (100-550K) showed that, as with radiation damaged silicon, crystallographic defects provided both donor and acceptor centres, with acceptors predominating. With a deposition temperature of 850C, the doping of the source was ineffective compared to the 'doping' provided by crystallographic defects. At 950C, the source doping had appreciable effect, but films made from n-type source material were still p-type. At 1050C, aluminium doping from the substrate gave p-type films. The Hall mobility was less the higher the temperature of deposition. This apparent anomaly may be explained in terms of the grain structure, using a model treated by Volger. The optical band edge absorption was more or less spread out according to the degree of crystallographic imperfection. (Author)
AD-656 673 Not available from CFSTI.

RADIATION STUDY ON MOS STRUCTURES,
Fairchild Camera and Instrument Corp Mountain View Calif Fairchild Semiconductor Div
E. H. Snow, A. S. Grove, and D. J. Fitzgerald.
Aug 67, 43p Rept no. Scientific-3
AFCRL-67-0381
Contract AF 19 (628)-5747
See also AD-648 236.

Descriptors: (*Semiconductors, *Radiation damage), (*Transistors, Radiation damage), Silicon, Oxidation, Silicon dioxide, Space charges, Interfaces, Carriers (Semiconductors), Processing, Electron bombardment, Fast neutrons, Semiconductor devices, Capacitors, Diodes (Semiconductor), Field effect transistors.
Identifiers: Metal oxide semiconductors.

Two effects of ionizing radiation on oxidized silicon surfaces have been reported: the formation of a space charge in the oxide and the creation of surface states at the oxide-silicon interface. In this report, the effects of processing variables--including substrate type, oxidation conditions, and gettering steps--on the above two phenomena are described. In addition, the effect of temperature on the rate of surface-state production is reported. High energy electron irradiations have been performed and the results compared to previous data taken with low energy electrons and X-rays. It is concluded that a given dose of any ionizing radiation has the same effect on the oxide space charge. Device studies have been extended to include junction field-effect transistors and it is concluded that these devices are less sensitive to ionizing radiation than either MOS or bipolar devices. Experiments with nuclear reactor irradiation show that in a reactor environment bulk damage due to fast neutrons dominates in the degradation of bipolar transistors, junction field-effect transistors, and p-n junction diodes, whereas, surface effects due to ionizing radiation present in the reactor are most important in the case of MOS transistors. (Author)
AD-656 678 HC$3.00 MF$0.65

SLOW MOVING FIELD DOMAINS IN CdS IN THE RANGE OF NEGATIVE DIFFERENTIAL CONDUCTIVITY.
Technical rept.,
Delaware Univ Newark Dept of Physics
K. W. Boer. Jul 67, 14p Rept no. TR-16
AROD-4461:19-P
Contract DA-31-124-ARO (D)-173

Descriptors: (*Cadmium sulfides, Transport properties), Carriers (Semiconductors), Polarization, Electric fields, Differential equations, Electrical conductance.
Identifiers: Domains (Crystallography), Negative differential conductivity.

Time periodic solutions of Poisson and transport equations in the range of negative differential conductivity due to field quenching were calculated by machine computation using parameters as obtained for cadmium sulfide and show the possibility that the hole concentration increases above the electron concentration in the high field domain. (Author)
AD-656 745 HC$3.00 MF$0.65

EFFECTS OF FINITE LATTICE HEAT CAPACITY ON SPIN LATTICE RELAXATION: THEORY AND NUMERICAL ANALYSIS,
National Bureau of Standards, Boulder, Colo. Inst. for Basic Standards.
Robert L. Peterson. 1 Aug 67, 26p
Hard copy available from Superintendent of Documents, GPO, Washington, D. C. 20402 $0.25.

Descriptors: (*Crystal lattices, Magnetic properties), (*Paramagnetic resonance, Relaxation time), (*Magnetic materials, Transients), Nuclear spins, Interactions, Phonons, Scattering, Specific heat, Cryogenics, Heat transfer, Theory, Numerical analysis.
Identifiers: Heat capacity, Spin-lattice relaxation, Spin-phonon interactions.

The transient magnetic behavior of a paramagnetic substance, after an initial disturbance, is considered theoretically for a variety of situations in which the lattice temperature rises as a result of energy flow from the magnetic (electron spin) system. The relaxation mechanisms considered are the direct process, involving interaction between spins and the resonant-phonon modes, and a T (9) Raman process, involving the remaining phonon modes. It is first assumed that the resonant and remaining modes are strongly coupled to each other, and that the helium bath has been removed (helium temperatures are assumed). Next, the opposite extreme is considered -- that in which the resonant and remaining modes are totally uncoupled; the helium bath is again assumed to have been removed. Two dramatic effects can occur, depending upon initial conditions. One is the rapid decay to saturation from initial inversion, due to an avalanching creation of resonant phonons by the spins. The second is the pronounced inhibition of the subsequent decay, with the spins remaining near saturation. Finally, consideration is given to the case of spins coupled only to the resonant phonons, which in turn are coupled to a constant temperature bath, whether this be the helium or the remaining modes. Recent phonon avalanche experiments are discussed in this context. It is pointed out that such experiments, performed in the absence of a bath, may provide a reliable measurement of inelastic phonon-boundary scattering.
NBS-MONO-102 MF$0.65

FABRICATION OF SEMICONDUCTOR DEVICES BY NEUTRON TRANSMUTATION DOPING.
Fundamental Methods Associates, Inc., New York.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 15.
NYO-3124-2 HC$3.00 MF$0.65

PRODUCTION AND ANNEALING OF INTRINSIC DEFECTS IN X-RAY IRRADIATED CADMIUM SULFIDE.

Delaware Univ., Newark. Dept. of Physics.
J. C. Oconnell. Jun 67, 76p NASA-CR-86629, TR-14
Grant NSG-573

Descriptors: *Annealing, *Cadmium sulfide, *Photoconductivity, *Single crystal, *X-ray irradiation, Cadmium, Crystal, Current, Defect, Displacement, Distribution, Heat, Irradiation, Measurement, Pure, Room, Single, Spectral, Stoichiometry, Sulfide, Temperature, Treatment, Ultrahigh, Vacuum, Vapor, X-ray.

For abstract, see STAR 05 18.
N67-31812 HC$3.00 MF$0.65

PRODUCTION AND ANNEALING OF INTRINSIC DEFECTS IN X-RAY IRRADIATED CD S SINGLE CRYSTALS.
Delaware Univ., Newark. Dept. of Physics.
K. W. Boer, and J. C. Oconnell. 1966, 13p NASA-CR-86611, TR-13
Grant NSG-573

Descriptors: *Annealing, *Cadmium sulfide, *Crystal structure defect, *Single crystal, *X-ray irradiation, Cadmium, Change, Crystal, Cycle, Damage, Defect, Distribution, High vacuum, Intrinsic, Irradiation, Measurement, Photocurrent, Platelet, Production, Single, Spectral, Structure, Sublattice, Sulfide, Vapor, X-ray.

For abstract, see STAR 05 18.
N67-31844 HC$3.00 MF$0.65

EFFECT OF VARIOUS OPTICAL RADIATIONS AND WATER VAPOR ON TRAPPING SPECTRUM OF CADMIUM SULFIDE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
P. A. Faeth. Jul 67, 18p NASA-TN-D-3974

Descriptors: *Cadmium sulfide, *Optical emission, *Radiation effect, *Trapped radiation, *Water vapor, Cadmium, Crystal, Current, Effect, Electron, Emission, Energy, Level, Optical, Photon, Radiation, Spectrum, Sulfide, Trap, Vapor, Water.

For abstract, see STAR 05 18.
N67-32122 HC$3.00 MF$0.65

CRUFT LABORATORY SEMIANNUAL PROGRESS REPORT, 1 JUL. - 31 DEC. 1966.
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
For primary bibliographic entry see Field 9C.
For abstract, see STAR 05 18.
N67-32215 HC$3.00 MF$0.65

X-RAY AND ELECTRON DAMAGE, AND PHOTOCHEMICAL REACTIONS IN CD S SINGLE CRYSTALS AND LAYERS, AND ANNEALING OF THESE DEFECTS FINAL REPORT.
Delaware Univ., Newark. Dept. of Physics.
K. W. Boer. Jul 67, 5p NASA-CR-86669
Grant NSG-573

Descriptors: *Cadmium sulfide, *Crystal structure defect, *Photochemical reaction, *Single crystal, *X-ray irradiation, Cadmium, Change, Crystal, Damage, Defect, Distribution, Electron, Heat, Photochemistry, Photoconductivity, Reaction, Single, Spectral, Structure, Sulfide, Treatment, Vacuum.

For abstract, see STAR 05 18.
N67-32395 HC$3.00 MF$0.65

THEORY OF DIFFUSION INSTABILITIES IN SEMICONDUCTORS.
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Microwave.
K. Bloettkjaer. 1 Jan 67, 66p RADC-TR-67-321, SR-12
Contract AF 61/052/-895
Z612340

Descriptors: *Diffusion, *Instability, *Semiconductor, Carrier, Electric, Field, Frequency, Mechanism, Microwave, Potential, Propagation, Property, Scattering, Theory, Transport.

For abstract, see STAR 05 18.
N67-32484 HC$3.00 MF$0.65

OPTICAL SPECTROSCOPY OF SEMICONDUCTOR MATERIALS FINAL SCIENTIFIC REPORT, 1 JAN. 1964 - 31 DEC. 1966.
Paris Univ. (France). Lab. de Physique des Solides.
M. Balkanski. 31 Dec 66, 12p AFCRL-67-0283, AD-653204
Contract AF 61/052/-789

Descriptors: *Infrared spectroscopy, *Optical spectrum, *Semiconductor, Absorption, Crystal, Damage, Defect, Impurity, Infrared, Lattice, Material, Optical, Phonon, Radiation, Silicon, Spectroscopy, Spectrum, Summary.

For abstract, see STAR 05 18.
N67-32548 HC$3.00 MF$0.65

APPLICATIONS AND OPTIMIZATION OF THE LITHIUMDRIFTED GERMANIUM DETECTOR SYSTEM,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 15.
UCRL-50156 HC$3.00 MF$0.65

20M. Thermodynamics

TWO-DIMENSIONAL HIGH SPEED FLOW OF RADIATING GAS.
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
For primary bibliographic entry see Field 20D.
AD-481 002 HC$3.00 MF$0.65

EFFECTS OF PRESSURE ON THE TRANSPORT OF IONS THROUGH ROTATING HELIUM II,
Chicago Univ Ill Dept of Physics
For primary bibliographic entry see Field 20H.
AD-655 948 Not available from CFSTI.

KINETIC EQUATIONS AND DENSITY EXPANSIONS: EXACTLY SOLVABLE ONE-DIMENSIONAL SYSTEM,
Yeshiva Univ New York Belfer Graduate School of Science
For primary bibliographic entry see Field 7D.
AD-656 012 Not available from CFSTI.

ENSEMBLE DEPENDENCE OF FLUCTUATIONS WITH APPLICATION TO MACHINE COMPUTATIONS,
Yeshiva Univ New York Belfer Graduate School of Science
For primary bibliographic entry see Field 7D.
AD-656 013 Not available from CFSTI.

THE HEAT CAPACITY OF CU (NO3)2.25H2O AT LOW TEMPERATURES,
Carnegie Inst of Tech Pittsburgh Pa Dept of Physics
S. A. Friedberg, and C. A. Raquet. 28 Jul 67, 11p Rept no. TR-7
Contract Nonr-760 (26)
Availability: Published in Unidentified Journal 11p nd.

Descriptors: (*Copper compounds, *Heat transfer), Cryogenics, Anomalies, Magnetic fields, Magnetic properties, Spin, Thermal properties, Atomic energy levels.
Identifiers: Copper nitrate.

The heat capacity, CP, of powdered Cu (NO3)2.2.5H2O has been measured between 0.5 and 4.2 degrees K. In zero applied field, CP exhibits a Schottky anomaly having its maximum value of 0,51R at 1.82 degrees K. The data are quantitatively described by assuming that Cu (++) ions exist in this salt in isolated pairs (binary clusters) coupled by isotropic antiferromagnetic exchange with J/k = 5.18 degrees K. The same model was previously found to give a good fit of the observed magnetic susceptibility. The present results, however, clearly exclude the possibility that Cu (++) ions in this material are coupled in extended linear chains. CP measured in an applied field of 8.7 kilogauss was found to be as predicted by the pair model. As a result of the isotropy of the pair interaction and the small singlet-triplet separation it has been possible to cool this salt by adiabatic magnetization of the powder in relatively small fields. (Author)
AD-656 224 Not available from CFSTI.

HEAT CAPACITY OF Mn (HCOO)2.2H2O BETWEEN 1.4 AND 20K.
Carnegie Inst of Tech Pittsburgh Pa Dept of Physics
For primary bibliographic entry see Field 20L.
AD-656 400 Not available from CFSTI.

AN INTERFEROMETRIC STUDY OF THE EFFECTS OF CORONA DISCHARGE ON THE TEMPERATURE PROFILES ON A FLAT, UNIFORM TEMPERATURE PLATE IN FORCED CONVECTION.
Ohio State Univ Research Foundation Columbus
For primary bibliographic entry see Field 20D.
AD-656 466 HC$3.00 MF$0.65

ON THE SOLUTION OF EQUATION OF TRANSFER FOR A GREY GAS ENCLOSED BETWEEN TWO PLANE SURFACES.
Research rept.,
Polytechnic Inst of Brooklyn N Y Dept of Aerospace Engineering and Applied Mechanics
Prem K. Khosla. Jun 67, 18p
PIBAL-1024
Contract Nonr-839 (34)

Descriptors: (*Heat transfer, *Gases), Equations, Integral equations, Surfaces, Thermal radiation.

A moment method adapted to the boundary conditions of the problem of radiative equilibrium of a grey gas enclosed between two parallel black surfaces is given. Radiative flux as a function of optical thickness based on the distance between the two surfaces and the temperature distribution are evaluated. The method is in the spirit of the generalization of the Milne-Eddington approximation. (Author)
AD-656 576 HC$3.00 MF$0.65

DERIVATION OF THE GENERALIZED MASTER EQUATION FOR COMPOSITE PARTICLES,
Naval Radiological Defense Lab San Francisco Calif
For primary bibliographic entry see Field 7D.
AD-656 586 HC$3.00 MF$0.65

A STUDY OF THE MEAN AND TURBULENT STRUCTURE OF A FREE JET AND JET IMPINGEMENT HEAT TRANSFER.
Aeronautical Research Associates of Princeton Inc N J

For primary bibliographic entry see Field 20D.
AD-656 592 HC$3.00 MF$0.65

MAYER'S THEORY OF CONDENSATION AND HOMOGENEOUS NUCLEATION,
Yale Univ New Haven Conn Dept of Engineering and Applied Science
Jean-Yves Parlange. Jul 67, 22p Rept no. 9
Contract Nonr-609 (47)
Rept. on Experimental and Theoretical Study of Condensation and Supercritical Heat Addition in Nozzle Flow.

Descriptors: (*Condensation, Theory), (*Nucleation, Theory), Integrals, Gases, Thermodynamics, Statistical mechanics.
Identifiers: Mayer's theory.

A study was made of Mayer's limiting processes (infinite series and V approaches infinity) in detail, showing that the density, rho sub c, where condensation takes place and the density rho sub c (infinity) where condensation should take place according to Mayer are indeed equal.
AD-656 640 HC$3.00 MF$0.65

CONDENSATION IN A RAPIDLY EXPANDING METAL VAPOR-INERT GAS MIXTURE,
Michigan Univ Ann Arbor Dept of Aerospace Engineering
P. M. Sherman, D. D. McBride, and E. Oktay.
Apr 67, 92p
ARL-67-0071
Contract AF 33 (615)-2307

Descriptors: (*Zinc, Vapors), (*Vapors, *Condensation), Helium, Mixtures, Particle size, Gas flow.
Identifiers: Metal vapors.

An investigation of the condensation of metal vapor in an inert carrier gas accelerated through nozzles was carried out. The mixture used is primarily zinc vapor in helium gas. Two types of condensation measurements are made. Measurement of particle size is made in the tunnel. Determination of condensation onset point is made in the exploding-wire system. Particle size is determined by means of a shuttered sampling device developed for the purpose combined with electron microscope techniques evolved. The condensation onset point is determined by nozzle static pressure measurement. Simplified computational analyses are made to predict conditions for the measured condensation onset point. They are also used as a guide for the more complex two component nonequilibrium expansion computation which may predict the location of the onset point as well as particle size. Measurements of particle size at the exit of a nominal Mach 25 (helium) nozzle showed a major portion of the total particles to be less than approx. 70 A in diameter. The pressure measurements made in a nominal Mach 3 nozzle indicated a large degree of supercooling. (Author)
AD-656 708 HC$3.00 MF$0.65

HIGH VELOCITY RADIATING FLOWS.
Final rept. Apr 63-Jun 67,
General Electric Co Philadelphia Pa Missile and Space Div
S. M. Scala, R. G. Breene, Jr., V. L. Kirk, J. L. Kulander, and R. T. Liner. 1 Jul 67, 18p
Contract Nonr-4188 (00)

Descriptors: (*Thermal radiation, *Gas flow), Heat transfer, Theory, Thermal properties, Excitation, Interactions, Molecules, Electrons, Distribution functions, Molecular energy levels.

Work on radiation problems is divided into three headings: radiative transfer theory, radiation properties, and radiating flows. Radiative transfer theory involves the solution of the radiative transfer equation. The computation of the local physical properties which appear in the radiative transfer equation, the absorption coefficient and the source function, appear in the section called Radiative Properties. The subjects of radiative properties and radiative transfer theory find application in radiating flow fields. The inelastic collision of electrons and molecules, in particular the excitation of rotational energy, is discussed.
AD-656 766 HC$3.00 MF$0.65

SHEAR STRENGTH OF SOFT-SOLDERED BRASS JOINTS AS A FUNCTION OF AGE AND TEMPERATURE HISTORY,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 13-.
For abstract, see NSA 21 15.
LA-3658 HC$3.00 MF$0.65

TABLES OF PARA-HYDROGEN DATA IN ENGINEERING UNITS FROM 36 DEGREES TO 5000 DEGREES R AT PRESSURES TO 5000 PSIA,
Los Alamos Scientific Lab., N. Mex.
Otis A. Farmer. 14 Feb 67, 159p
Contract W-7405-eng-36

Descriptors: (*Engineering, *Tables), (*Hydrogen, Pressure), Temperature, Thermodynamics, Coding, Errors, Graphics, Interpolation.

For abstract, see NSA 21 15.
LA-3669 HC$3.00 MF$0.65

ADVANCED SUPERCONDUCTING MAGNETS INVESTIGATION QUARTERLY PROGRESS REPORT, 10 FEB. - 10 MAY 1967.
Avco-everett Research Lab., Everett, Mass.
10 May 67, 35p NASA-CR-86615, QPR-2
Contract NAS8-21037

Descriptors: *Heat flux, *Liquid helium, *Superconducting magnet, *Thermoconductivity, Anisotropy, Approximation, Coefficient, Current, Distribution, Equation, Flux, Heat, Helium, Liquid, Magnet, Nonlinear, Stability, Superconductor, Transfer.

For abstract, see STAR 05 18.
N67-31518 HC$3.00 MF$0.65

THE LAMINAR BOUNDARY LAYER IN A RADIATING ABSORBING GAS NEAR A FLAT PLATE.
Laminarnyy Pogranichnyy Sloy V Izluchayush Che-pogloshchayushchem Gaze Okolo Ploskoy Plastinki
National Aeronautics and Space Administration, Washington, D. C.
V. P. Zamurayev. Dec 65, 14p NASA-TT-F-411
Transl. Into English From Zh. Prik. Mekhan. I Techn. Fiz. (Moscow), No. 3, 1964 P 73-80

Descriptors: *Asymptotic function, *Flat plate, *Gas, *Heat transfer, *Laminar boundary layer, *Steady state flow, Absorption, Asymptote, Boundary, Coefficient, Conduction, Difference, Flat, Flow, Flux, Function, Heat, Laminar, Layer, Method, Plate, Power, Problem, Radiation, Solution, State, Steady, Transfer.

For abstract, see STAR 05 18.
N67-31858 HC$3.00 MF$0.65

LAMINAR FLOW ANALYSIS OF FILM BOILING FROM A HORIZONTAL WIRE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
K. J. Baumeister, and T. D. Hamill. Jul 67, 46p
NASA-TN-D-4035

Descriptors: *Film boiling, *Heat-transfer coefficient, *Laminar flow, *Wire, Boiling, Coefficient, Energy, Film, Flow, Horizontal, Laminar, Mathematics, Model, Momentum, Pool, Pressure, Transport, Vapor.

For abstract, see STAR 05 18.
N67-32089 HC$3.00 MF$0.65

THEORETICAL SOLUTION OF THE NONLINEAR PROBLEM OF TRANSIENT COOLING OF AN OPAQUE SPHERE IN SPACE.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
E. W. Adams, and H. Spreuer. Aug 67, 13p
NASA-TN-D-4046
Contract 188-45-01-01-51

Descriptors: *Meteor, *Space environment, *Sphere, *Temperature distribution, Distribution, Environment, Fourier law, Heat, Homogeneity, Opaque, Radiation, Radius, Space, Surface, Temperature, Travel, Vacuum.

For abstract, see STAR 05 18.
N67-32551 HC$3.00 MF$0.65

ACTIVATION, GROWTH, AND DETACHMENT OF BOILING BUBBLES IN WATER FROM ARTIFICIAL NUCLEATION SITES OF KNOWN GEOMETRY AND SIZE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
J. R. Howell, and R. Siegel. Aug 67, 43p NASA-TN-D-4101
Contract 129-01-11-06-22

Descriptors: *Bubble, *Metal surface, *Nucleate boiling, *Water, Activation, Artificial, Boiling, Detachment, Geometry, Growth, Influence, Metal, Nucleate, Size, Surface.

For abstract, see STAR 05 18.
N67-32560 HC$3.00 MF$0.65

AN EQUATION OF STATE FOR FLUID PARAHYDROGEN FROM THE TRIPLE-POINT TO 100K AT PRESSURES TO 350 ATMOSPHERES,
National Bureau of Standards, Boulder, Colo. Inst. for Materials Research.
Robert D. Goodwin. 19 Dec 66, 11p R-429
Published in Journal of Research v71 n3 p203-12 May-June 1967.

Descriptors: (*Liquefied gases, Helium), (*Helium, *Equations of state), Thermodynamics, Specific heat, Pressure, Volume, Temperature, Tables, Cryogenics.
Identifiers: Parahydrogen.

An equation of state is given which may be useful for interpolation and for computations which include thermodynamic properties of parahydrogen. A principal advantage is that it employs only one set of 24 coefficients for all fluid states. The basic form is relatively simple. An adjustment term for the critical region leads to good agreement with published PVT data and specific heats in this especially difficult area. The forms of fitting functions were developed by systematic trial methods using least squares to find coefficients. (Author)
PB-175 623 HC$3.00 MF$0.65

LIQUID-VAPOR EQUILIBRIUM IN THE SYSTEM HELIUM-METHANE,
National Bureau of Standards, Boulder, Colo. Inst. for Materials Research.
For primary bibliographic entry see Field 7A.
PB-175 624 HC$3.00 MF$0.65

THE CONDENSATION OF STEAM AT LOW PRESSURES.
California Univ., Berkeley. Space Sciences Lab.
For primary bibliographic entry see Field 7D.
PB-175 703 HC$3.00 MF$0.65

FORTRAN PROGRAM (TEMCAL) FOR CALCULATION OF HUGONIOT TEMPERATURES,

ISOTHERMS, AND RELEASE ADIABATS FROM HYDRODYNAMIC DATA,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 9B.
For abstract, see NSA 21 15.
UCRL-50210 HC$3.00 MF$0.65

20N. Wave Propagation

TABULATIONS OF VHF PROPAGATION DATA OBTAINED OVER IRREGULAR TERRAIN AT 20, 50, AND 100 MHZ.
Technical rept.,
Institute for Telecommunication Sciences and Aeronomy Boulder Colo
M. E. Johnson, M. J. Miles, P. L. McQuate, and A. P. Barsis. May 67, 401p Rept no. ITSA-38 IER-38
See also AD-655 901.

Descriptors: (*Radio transmission, Very high frequency), Propagation, Terrain, High frequency, Colorado, Tables.

The report contains tabulations of transmission loss data resulting from propagation experiments at 20, 50, and 100 MHz conducted over irregular terrain in the Colorado high plains east of the Continental Divide. Although analysis results have already been described in several unpublished reports and in papers by Miles and Barsis (1966) and Barsis and Miles (1967), it seems appropriate to present a complete compilation of all data obtained in this program together with other pertinent information. In this way, additional analyses for specific purposes will be facilitated.
AD-655 854 HC$3.00 MF$0.65

HEIGHT GAIN, LOCATION GAIN, AND CORRELATION IN IRREGULAR TERRAIN AT 20, 50, AND 100 MHz.
Technical rept.,
Institute for Telecommunication Sciences and Aeronomy Boulder Colo
A. P. Barsis, and M. J. Miles. Apr 67, 69p Rept no. ITSA-35
IER-35
See also AD-655 854.

Descriptors: (*Radio transmission, Very high frequency), Gain, Correlation techniques, Terrain, High frequency, Antennas, Altitude, Measurement, Graphics.

Results on height gain, location gain, and correlation are presented which are based on data obtained from a comprehensive measurement program in irregular terrain at frequencies of 20, 50, and 100 MHz. Specifically, it was found that height gain, but not location gain, is independent of path distance for transmission paths up to 80 km long. Location gain is defined as the reduction in transmission loss obtainable by a search within a 100-m radius of a nominal receiving point. The measurement program permitted simulation of the interaction between net and relay type communication links by simultaneous recordings of signals received from a test station with low transmitting antenna height, and a commercial frequency modulation broadcast station (not co-located) with a high transmitting antenna. It was found that the correlation coefficient between transmission loss values from the two sources is close to unity when the transmission paths have a small angular separation, but decreases with increasing angle between transmission paths. (Author)
AD-655 901 HC$3.00 MF$0.65

CONSOLIDATED SEMIANNUAL PROGRESS REPORT.
University of Southern California Los Angeles Electronic Sciences Lab
For primary bibliographic entry see Field 20L.
AD-656 025 HC$3.00 MF$0.65

COMPLEX REPRESENTATION OF OPTICAL FIELDS IN COHERENCE THEORY,
Rochester Univ N Y Dept of Physics and Astronomy
For primary bibliographic entry see Field 20F.
AD-656 209 Not available from CFSTI.

ON TRANSITION FUNCTIONS OCCURRING IN THE THEORY OF DIFFRACTION IN INHOMOGENEOUS MEDIA,
Polytechnic Inst of Brooklyn N Y Dept of Electrophysics
For primary bibliographic entry see Field 20F.
AD-656 217 Not available from CFSTI.

BALANCED RADIO FREQUENCY CABLES,
American Phenolic Corp Chicago Ill
For primary bibliographic entry see Field 9A.
AD-656 264 HC$3.00 MF$0.65

ANALYTICAL AND EXPERIMENTAL STUDIES OF MICROWAVE INTERACTION WITH A HYPERSONIC AIR PLASMA,
Cornell Aeronautical Lab Inc Buffalo N Y
For primary bibliographic entry see Field 20I.
AD-656 358 HC$3.00 MF$0.65

SHORT-TERM AND AVERAGED CHARACTERISTICS OF NONRECIPROCAL HF IONOSPHERIC PATHS.
Revised ed.,
Defence Research Telecommunications Establishment Ottawa (Ontario)
G. W. Jull. 14 Nov 66, 11p
Presented at the Symposium of the AGARD Electromagnetic Wave Propagation Committee on Ionospheric Oblique Radio Wave Propagation near the Lowest Usable Frequency (11th), Leicester, England, July 25-29, 1966. Revision of manuscript submitted 25 Aug 66.
Availability: Published in IEEE Transactions on Antennas and Propagation vAP15 n2 p268-77 Mar 1967.

Descriptors: (*Ionospheric propagation, Electromagnetic waves), High frequency, Polarization, Attenuation, Tables, Errors, Radio transmission.

The paper reports an investigation into the ability of ray theory to explain nonreciprocity on HF ionospheric paths. It first reviews and extends some of the predictions of the ray theory of reciprocity as applied to single and multi-hop propagation paths. In this, ray theory predicts nonreciprocity in phase for single magnetoionic waves transmitted between horizontally polarized antennas. If the antennas are elliptically polarized, there can also be nonreciprocity in amplitudes. It is shown that experimental observations on several circuits using linearly polarized antennas support the validity of predictions based on ray theory. In particular: the correlation between two-way, short-term fading of pulsed signals was positive and high when only one magnetoionic wave was present in the signal, but negative or low when both ordinary and extraordinary waves were present; the six-minute averaged path loss in opposite directions was equal within experimental errors for signals that underwent polarization fading. Short-term discrepancies were found and these can be attributed to insufficient averaging of polarization fading effects. Systematic differences in the path loss in opposite directions observed by others could be explained if the antennas were elliptically polarized for transmission paths that deviated from the great-circle path. (Author)
AD-656 676 Not available from CFSTI.

EARTH CONVERAGE FROM A CIRCULARLY SYMMETRIC SHAPED-BEAM ANTENNA ON A SYNCHRONOUS SATELLITE.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 9F.
AD-656 707 HC$3.00 MF$0.65

IONOSPHERIC PERTURBATIONS AND SCHUMANN RESONANCE DATA.
Massachusetts Inst of Tech Cambridge Geophysics Lab
For primary bibliographic entry see Field 4A.
AD-656 761 HC$3.00 MF$0.65

A THEORETICAL STUDY OF ANTENNAS IN MOVING IONIZED MEDIA. PART I - THE RECEIVING AREA OF A DIPOLE ANTENNA IN A MOVING MEDIUM FINAL REPORT, MAY 1966 - JUN. 1967.
Northrop Corp., Newbury Park, Calif. Applied Research Dept.
K. S. Lee. Jun 67, 32p NASA-CR-86683
Contract NAS12-115

Descriptors: *Conservation law, *Dipole antenna, *Electrodynamics, *Ionized gas, *Minkowski theory, Absorption, Antenna, Dipole, Field, Gas, Ionized, Medium, Moving, Plane, Power, Receiving, Wave.

For abstract, see STAR 05 18.
N67-31657 HC$3.00 MF$0.65

APERTURE REFLECTION COEFFICIENT OF A PARALLEL- PLATE WAVEGUIDE BY WEDGE DIFFRACTION ANALYSIS.
Ohio State Univ., Columbus. Electro Science Lab.
R. C. Rudduck, and L. L. Tsai. Jul 67, 45p
NASA-CR-818, TR-1691-20
Grant NSG-448

Descriptors: *Aperture, *Diffraction, *Parallel plate, *Reflection coefficient, *Waveguide, Antenna, Coefficient, Parallel, Plate, Reflection, Wedge.

For abstract, see STAR 05 18.
N67-31802 HC$3.00 MF$0.65

THE SCATTERING OF ELECTROMAGNETIC WAVES FROM A PLASMA-IMMERSED CYLINDER SCIENTIFIC REPORT.
Michigan Univ., Ann Arbor. High Altitude Engineering Lab.
For primary bibliographic entry see Field 20I.
For abstract, see STAR 05 18.
N67-31813 HC$3.00 MF$0.65

A THEORETICAL STUDY OF ANTENNAS IN MOVING IONIZED MEDIA. PART II - THE COMPLEX DOPPLER EFFECT FINAL REPORT, MAY 1966 - JUN. 1967.
Northrop Corp., Newbury Park, Calif. Applied Research Dept.
K. S. Lee. Jun 67, 36p NASA-CR-85024
Contract NAS12-115

Descriptors: *Doppler effect, *Electromagnetic wave, *Plasma oscillation, *Wave propagation, Calculation, Complex, Dispersion, Electromagnetic, Medium, Movement, Oscillation, Plasma, Point, Propagation, Source, Wave.

For abstract, see STAR 05 18.
N67-31835 HC$3.00 MF$0.65

INVESTIGATION OF REFLECTIONS BY THE MOON'S SURFACE OF METER RADIOWAVES.
Issledovaniye Otrazheniy Metrovykh Radiovoln Poverkhnost'yu Luny
Volt Technical Corp., Washington, D. C.
O. I. Yakovlev, and A. I. Yefimov. 16 Jun 67, 4p
NASA-CR-86662, ST-LPS-RWR-10626
Contract NAS5-12487

Transl. Into English From Dokl. Akad. Nauk Sssr (Moscow), V. 174, No. 3 P 583-584

Descriptors: *Dielectric constant, *Lunar surface, *Radio wave, *Wave reflection, Constant, Data, Dependency, Dielectric, Lunar, Meter, Plot, Radio, Reflection, Rock, Scattering, Surface, Wave.

For abstract, see STAR 05 18.
N67-31836 HC$3.00 MF$0.65

REFLECTION MEASUREMENTS IN TRANSMISSION TECHNOLOGY USING BROADBAND FREQUENCY MODULATION IN THE MICROWAVE REGION.
Reflexionsmessung in Der Leitungtechnik Mittels Breitbandiger Frequenzmodulation Im Mikrowellengebiet
Eidgenossische Technische Hochschule, Zurich (Switzerland).
C. Mahle. 1966, 88p DISS-3800
in German, English Summary

Descriptors: *Frequency modulation, *Reflection coefficient, *Transmission line, Angle, Broadband, Coefficient, Distance, Frequency, Impedance, Instrument, Line, Magnitude, Microwave, Modulation, Phase, Plotting, Radar, Reflection, System, Transmission, Waveguide, X-band.

For abstract, see STAR 05 18.
N67-32030 HC$3.00 MF$0.65

BIBLIOGRAPHY ON WAVES IN PLASMAS,
Institute for Telecommunication Sciences and Aeronomy, Boulder, Colo.
James R. Wait, and Eileen A. Brackett. Apr 67, 32p ITSA-39
IER-39

Descriptors: (*Electromagnetic waves, Bibliographies), (*Plasma physics, Bibliographies), Subject indexing, Boundary layer, Ionosphere, Thermonuclear reactions, Classification.

The bibliography contains a selected listing of current papers which are related in some way to the phenomena of waves in the plasma with particular reference to boundary effects and other inhomogeneities. As indicated by the table of contents, the titles are listed under 14 subject headings. As a further aid, shown in parentheses is a secondary designation after a title if it could have been equally as well located under another heading. (Author)
PB-175 657 HC$3.00 MF$0.65

THE NONLINEAR MICROWAVE EFFECTS IN CONDUCTORS.
Technical rept.,
Utah Univ., Salt Lake City. Microwave Device and Physical Electronics Lab.
Su-Min Chou, and Curtis C. Johnson. Jul 67, 92p
TR-NSF-12
Grant NSF-GK-717

Descriptors: (*Films, *Superconductors), (*Microwaves, Superconductors), Nonlinear systems, Electromagnetic fields, Attenuation, Conductivity, Reflection, Partial differential equations, Computers, Tin, Mica.

The report examines some proposed nonlinear effects at microwave frequencies in conducting media. Nonlinear conductivity is expressed in terms of a Taylor's series expansion for omicron with derivatives of omicron with respect to H, and the theory of second and third harmonic generation is developed for thin film and bulk nonlinear conductors. Parametric interactions are also examined. Second and third harmonics have been observed by other workers when thin film and bulk superconductors are subjected to intense microwave radiation. The theory developed in the report may be used to design harmonic generation experiments and calculate power and conversion efficiencies in terms of the omicron versus H properties of the nonlinear conducting material. A quantitative explanation of the generation and propagation of harmonic waves in a nonlinear conducting sheet is given. The analysis presented here has direct application to the understanding of harmonic generation in superconductors, and in plasmas, semiconductors, and semimetals near cyclotron resonance where omicron is a nonlinear function of magnetic field. In addition to being useful in the design of harmonic generation and parametric devices using nonlinear conductors, the analysis enables one to calculate parameters of basic physical interest about the nonlinear material in terms of microwave reflection, transmission, and phase measurements. (Author)
PB-175 689 HC$3.00 MF$0.65

21. PROPULSION AND FUELS

21B. Combustion and Ignition

RADICAL CONCENTRATIONS AND DECAYS IN LEAN HYDROGEN-NITROGEN-OXYGEN FLAMES.
Revised ed.,
Canterbury Univ Christchurch (New Zealand) Dept of Chemistry
M. J. Mcewan, and L. F. Phillips. Jul 66, 10p
AFOSR-67-1641
Grant AF-AFOSR-264-65
Revision of manuscript submitted Jun 66.
Availability: Published in Combustion and Flame v11 n1 p63-70 Feb 1967.

Descriptors: (*Flames, *Free radicals), Hydrogen, Nitrogen, Oxygen, Combustion, Concentration (Chemistry), Chemiluminescence, Sodium chloride, Copper compounds, Hydrides, Lithium compounds, Sodium compounds, Hydroxides, Iodine compounds, Bromine compounds, Oxides, Additives, New Zealand.

Photometric observations of trace additives have been used to measure radical concentrations in some fuel-lean hydrogen-nitrogen-oxygen flames. The NaCl and CuH methods of measuring H-concentration have proved to be inapplicable to these flames, but the LiOH method for H-concentration, the NaOH method for OH-concentration and the IO (or BrO) method for O-concentration were used successfully. It is believed that the LiOH method is not seriously affected by LiO2 formation. Evidence in support of a value of 104 kcal/mole for the dissociation energy of LiOH has been obtained. Radical recombination or chemiluminescent excitation processes involving the recombination of oxygen atoms to form O2 are considered. (Author)
AD-655 989 Not available from CFSTI.

OIL CONTAMINATION IN OXYGEN SYSTEMS.
General Dynamics Corp Groton Conn Electric Boat Div
For primary bibliographic entry see Field 13L.
AD-656 126 HC$3.00 MF$0.65

EXPERIMENTAL STUDY OF CHEMI-IONIZATION.
Louvain Univ (Belgium) Lab of Inorganic Chemistry
For primary bibliographic entry see Field 7D.
AD-656 343 HC$3.00 MF$0.65

COMBUSTION GAS EMITTED RADIATION AND CHEMILUMINESCENCE PHENOMENA IN SOLID-GAS REACTING SYSTEMS.
Annual technical status rept. 15 Apr 66-15 Apr 67,
Astrosystems International Inc Rockaway N J
John S. Gordon. 21 Apr 67, 23p Rept no. TR-66001-F
AFOSR-67-1795
Contract AF 49 (638)-1720
See also AD-635 161.

Descriptors: (*Flames, Spectroscopy), (*Combustion chamber gases, Spectroscopy), (*Chemiluminescence, Combustion chamber gases), Emissivity, Plastics, Combustion, Reaction kinetics, Band spectrum, Continuous spectrum, Polyester plastics, Acetal plastics, Polyethylene plastics, Acrylic resins, Nylon, Halocarbon plastics, Phosphine.

The study was concerned with emission spectra of flames and combustion gases at low pressure of premixed oxygen-hydrogen-ethylene with various solid fuels (plastics), with applications to chemiluminescence, kinetics and reaction mechanism elucidation. Premixed O2-C2H4-PH3 flames were also studied. Attempts to combust plastic samples with oxidizers directly at low pressure without a stable gaseous fuel-oxidizer flame were unsuccessful. Spectral scans coupled with thermochemical analyses indicated several bimolecular reaction mechanisms forming excited species at low pressure with characteristic signatures: CH + N to CN* + H; N + O to NO ((2)pi) to NO*; CH + CH to C2* + H2; C + HO2 to CO* + OH; C2 + ClO to CCl* + CO; CCl + OH to CO* + HCl. In addition, emission bands from C3, NH, OH, CH, PO and a continuum possibly due to PO2 were seen. (Author)
AD-656 426 HC$3.00 MF$0.65

STEADY-STATE FIRST-ORDER REACTION AT AN INFINITE PLANE SURFACE TO WHICH REACTANT DIFFUSES FROM A POINT SOURCE.
Virginia Univ Charlottesville
For primary bibliographic entry see Field 7D.
AD-656 637 Not available from CFSTI.

THE COMBUSTION OF POROUS ALUMINUM PLUGS WITH OXYGEN THROUGHOUT.
Technical rept.,
Stevens Inst of Tech Hoboken N J Dept of Mechanical Engineering
Robert F. McAlevy, III, Suh Y. Lee, and Robert Wilson, Jr. Jul 67, 20p Rept no. ME-RT-67007
Contract Nonr-263 (48)

Descriptors: (*Aluminum, *Combustion), (*Porous metals, Combustion), (*Hybrid rocket propellants, Combustion), Oxygen, Porosity, Metallic textiles, Combustion chambers.

Combustion of aluminum with oxygen was experimentally studied in the porous-plug configuration. Porous aluminum plugs of different internal structures and void contents were burned at atmospheric pressure with O2 passed up through the specimens to emerge at the burning surface. Burning was achieved for an overall fuel-oxidant equivalence ratio variation of a factor of 4; burning surface regression rates approach 1 inch per second. Periodic accumulation and ejection of burning surface material at low O2 throughout levels appears similar to that exhibited by some aluminized solid propellant and hybrid propellant rocket motors. The results indicate that a porous-metal hybrid approach represents possibly the best means of achieving the ultimate performance potential of a chemical rocket motor. (Author)
AD-656 762 HC$3.00 MF$0.65

THERMAL RADIATION OF HIGH-TEMPERATURE COMBUSTION PRODUCTS.
Final technical rept. 1 Jan 65-29 Jul 66,
Bell Aerosystems Co Buffalo N Y
Theodor G. Rossmann, and Leroy M. Wood. Jan 67, 236p Rept no. 9139-933003
AFOSR-67-0951
Contracts AF 49 (638)-1498, AF 49 (638)-1287

Descriptors: (*Combustion products, Thermal radiation), (*Thermal radiation, Spectroscopy),

High-temperature research, Flames, Exhaust gases, Oxygen, Alkynes, Carbon monoxide, Emissivity, Band spectrum, Instrumentation, Liquid rocket propellants.

An experimental program was initiated in an effort to amplify the scarce existing information concerning those physical properties of gases which determine their thermal radiation at high temperatures and elevated pressures. Well-known methods of quantitative spectroscopy were used for this purpose. Experimental methods were developed for producing the test gas in a certain zone in a flame burning in an inert gas, the pressure of which would be varied within certain limits. The experimental technique was developed at atmospheric pressure in order to keep to a minimum the experimental difficulties. A water cooled multihole burner with a radiating path length of 11 cm was developed. The burner, when fed by premixed oxygen and acetylene at the proper mixture ratio and surrounded by a high velocity shield of nitrogen gas, contained a test zone where CO was the only radiating component of the 3100K combustion products. The evaluation of the radiation measurements conducted on the test zone showed that successful techniques were developed for producing and isolating from the surrounding environment a uniform high temperature test gas. A thorough analysis was conducted concerning the reliability of the approximate measurements of the radiative properties of gases that must necessarily be obtained from a real spectrometer of limited sensitivity and resolution. (Author)
AD-656 775 HC$3.00 MF$0.65

A STUDY OF LINE SHAPE FOR CO INFRARED EMISSION LINES.
Final rept. 1 Jan 64-31 Mar 67,
Catholic Univ of America Washington D C Dept of Physics
William S. Benedict, James A. Dowling, Jarus W. Quinn, and Shirleigh Silverman. 30 Jun 67, 135p
AFCRL-67-0438
Contract AF 19 (628)-3870

Descriptors: (*Combustion products, *Infrared spectroscopy), (*Carbon monoxide, Spectra (Infrared)), Flames, Alkynes, Oxygen, Emissivity, Line spectrum, Resolution, Special functions (Mathematical), Band spectrum, Instrumentation.

The shape of several vibration-rotation lines of CO emitted by a C2H2-O2 flame was investigated. An equivalent width measurement was made using an absorption cell of room temperature CO as an analyzer. Analysis of the data showed that line shapes could be fitted to a Voigt function with shape parameters between 1.0 and 1.5. A computer program was formulated to calculate integrated emissivities with a Voigt function line shape. The collision widths of the flame lines, as determined by the shape parameters, are in essential agreement with earlier room temperature measurements. The extrapolation of the widths measured at room temperature to high temperature was shown to be reliable within the accuracy of this experiment. (Author)
AD-656 779 HC$3.00 MF$0.65

EXPERIMENTAL BEHAVIOR OF PENTABORANE-AIR COMBUSTION PRODUCTS DURING EXPANSION IN A CONVERGENT DIVERGENT NOZZLE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 21E.
For abstract, see STAR 05 18.
N67-31730 HC$3.00 MF$0.65

21E. Jet and Gas Turbine Engines

A METHOD OF CALCULATING QUASI TWO-DIMENSIONAL FLOWS THROUGH CASCADES,
California Inst of Tech Pasadena Hydrodynamics Lab
For primary bibliographic entry see Field 20D.
AD-656 428 HC$3.00 MF$0.65

TEST OF AVIATION ENGINES,
Foreign Technology Div Wright-Patterson AFB Ohio
B. E. Brusyanov. 4 May 67, 167p Rept no. FTD-MT-65-435
TT-67-62511
Edited machine trans. of mono. Ispytanie Aviatsionnykh Dvigatelei, n.p., 1945 147p.

Descriptors: (*Aircraft engines, Tests), Power, Fuel consumption, Performance (Engineering), Pressure, Temperature, Test equipment, Operation, Malfunctions, USSR.

The book concerns questions of purpose and views of aircraft engine tests, the organization of testing installations, the organization and principles of action of instruments applied during the tests. A method of carrying out the test and a method of processing obtained during the tests of materials are considered. Also, types of testing stations and certain questions of operating safety, and hygiene techniques are discussed in the book. Many conclusions are simplified to facilitate mastering the material. Chapters not pertaining directly to the tests, concerning, for instance, questions of general motor theory, questions about fuels and oils sometimes included in books on testing, are omitted.
AD-656 565 HC$3.00 MF$0.65

AERODYNAMICS OF POWER PLANT INSTALLATION, PART I.
Advisory Group for Aeronautical Research and Development Paris (France)
Oct 65, 367p Rept no. AGARDograph-103-Pt-1
See also AD-656 570. NATO Furnished.

Descriptors: (*Aircraft engines, Aerodynamics), Transport planes, Supersonic combustion ramjet engines, Axial-flow compressors, Nozzle gas flow, Exhaust gases, Ramjet engines, Turbojet engines, Supersonic flight, Drag, Aircraft engine ducts, Performance (Engineering), Symposia.

Contents: Engine designer's point of view; A discussion of selected aerodynamic problems on integration of propulsion systems with airframe on transport aircraft; The feasibility of supersonic combustion ramjets for low hypersonic speeds; The blunt trailing edge axial-flow supersonic compressor; Measurements of relaxation effects in nozzle flow of hot combustion gases by means of a shock tube technique; Aircraft performance problems associated with engine and intake installation; Low-drag installation of twin propulsion nozzles in the rear of the fuselage for transonic and supersonic flight; Method of net thrust measurement in supersonic flight; Past flight experience and recent developments in combinations of ramjet and turbojet engines; Additive drag on inlet cowls and its effect on aircraft performance; Intake design and performance around a Mach number of 2.2; Fonctionnement du piege a couche limite interne d' une prise d' air a compression supersonique externe; A general method for calculating low speed flow about inlets.
AD-656 569 HC$3.00 MF$0.65

AERODYNAMICS OF POWER PLANT INSTALLATION, PART II.
Advisory Group for Aeronautical Research and Development Paris (France)
Oct 65, 376p Rept no. AGARDograph-103-Pt-2
See also AD-656 569. NATO Furnished.

Descriptors: (*Aircraft engines, Aerodynamics), Aircraft engine ducts, Boundary layer, Supersonic flow, Wings, Propulsion, Transport planes, Supersonic planes, Vertical take-off planes, Lift, Wind tunnel models, Short take-off planes, Symposia.

Contents: An investigation of splitter plates for supersonic twin inlets; Boundary-layer interaction effects in intakes with particular reference to those designed for dual subsonic and supersonic performance; Possibilites actuelles d' etude theorique d' une tuyere supersonique a double-flux; Methods of measuring aerodynamic efficiency and thrust vectors of engine exhaust systems; Propulsion system integration in wings; A fully integrated propulsion system for a supersonic transport aircraft; Jet VTOL power plant experience during flight test of X-14A VTOL research vehicle; Jet lift intakes; Techniques for the simulation of jet-lift engines in wind-tunnel models of V/STOL aircraft; Aerodynamic interference effects with jet lift schemes on V/STOL aircraft at forward speeds; Lift-fan V/STOL propulsion and airframe integration; NASA research on the aerodynamics of jet VTOL engine installations; Experimental studies of VTOL fan-in-wing inlets.
AD-656 570 Not available from CFSTI.

EXPERIMENTAL INVESTIGATION OF PARTIAL AND FULL-ADMISSION CHARACTERISTICS OF A TWO- STAGE VELOCITY-COMPOUND TURBINE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
F. W. Klag, Jr., and T. P. Moffitt. Oct 60, 22p
NASA-TM-X-410

Descriptors: *Performance characteristics, *Two-stage turbine, Admission, Characteristics, Configuration, Efficiency, Energy, Fuel, Impulse, Kinetic, Liquid, Output, Performance, Recovery, Rocket, Second, Stage, Supersonic, Turbine, Two, Work.

For abstract, see STAR 05 18.
N67-31525 HC$3.00 MF$0.65

DESIGN AND EXPERIMENTAL INVESTIGATION OF TWO ROTOR BLADE MODIFICATIONS FOR A HIGH WEIGHT FLOW, LOW PRESSURE RATIO TURBINE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
R. R. Nunamaker, D. A. Petrash, and C. A. Wasserbauer. Sep 59, 25p NASA-TM-X-7

Descriptors: *Axial flow turbine, *Engine design, *Rotor blade, Axial, Blade, Characteristics, Configuration, Design, Engine, Flow, Low pressure, Mechanical, Modification, Performance, Rotor, Turbine, Turbojet.

For abstract, see STAR 05 18.
N67-31528 HC$3.00 MF$0.65

ALTITUDE PERFORMANCE OF A FULL-SCALE HIGH-TEMPERATURE TURBOJET ENGINE USING PENTABORANE FUEL AND HEF-2.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
J. N. Sivo, and J. P. Wanhainen. Jan 59, 41p
NASA-MEMO-12-31-58E

Descriptors: *Altitude simulation, *Engine testing, *High energy fuel (hef), *Pentaborane, *Turbojet engine, Altitude, Boron, Combustor, Deposition, Engine, Fuel, High energy, High temperature, J-47 engine, Modification, Oxide, Simulation, Testing, Thrust, Turbojet.

For abstract, see STAR 05 18.
N67-31544 HC$3.00 MF$0.65

PROCEEDINGS OF NASA CONFERENCE ON SUPERSONIC-TRANSPORT FEASIBILITY STUDIES AND SUPPORTING RESEARCH.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 1C.
For abstract, see STAR 05 18.
N67-31606 HC$3.00 MF$0.65

SINGLE STAGE EXPERIMENTAL EVALUATION OF VARIABLE GEOMETRY GUIDE VANES AND STATORS. PART II - ANNULAR CASCADE INVESTIGATIONS OF CANDIDATE VARIABLE GEOMETRY DESIGNS.
Pratt and Whitney Aircraft, West Palm Beach, Fla. Florida Research and Development Center.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 18.
N67-31727 HC$3.00 MF$0.65

EXPERIMENTAL BEHAVIOR OF PENTABORANE-AIR COMBUSTION PRODUCTS DURING EXPANSION IN A CONVERGENT DIVERGENT NOZZLE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
J. R. Branstetter, and P. C. Setze. 18 Feb 58, 69p NACA-RM-E57120

Descriptors: *Afterburning, *Boron oxide, *Convergent-divergent nozzle, *Jet fuel, *Pentaborane, Air, Boron, Characteristics, Combustion, Combustor, Convergence, Divergence, Engine, Expansion, Fuel, Jet, Mixture, Nozzle, Oxide, Performance, Product, Ramjet, Test, Turbojet.

For abstract, see STAR 05 18.
N67-31730 HC$3.00 MF$0.65

PERFORMANCE OF THREE ISENTROPIC ALL INTERNAL COMPRESSION AXISYMMETRIC INLETS DESIGNED FOR MACH 2.5.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
B. H. Anderson, and D. N. Bowditch. Sep 60, 29p NASA-TM-X-259

Descriptors: *Air jet, *Compression tube, *Performance characteristics, Air, Angle of attack, Axisymmetry, Bleed, Change, Characteristics, Compression, Inlet, Internal, Isentropy, Jet, Mach number, Optimum, Performance, Speed, Starting, Supersonic, System, Tolerance, Tube.

For abstract, see STAR 05 18.
N67-31843 HC$3.00 MF$0.65

DESIGN AND EXPERIMENTAL INVESTIGATION OF A HIGH-WEIGHT-FLOW LOW-PRESSURE-RATIO TURBINE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
R. R. Nunamaker, D. A. Petrash, and C. A. Wasserbauer. Sep 59, 32p NASA-TM-X-6

Descriptors: *Pressure ratio, *Rotor blade, *Stator blade, *Turbine blade, Air, Blade, Characteristics, Coefficient, Diffusion, Loading, Low pressure, Performance, Pressure, Ratio, Rotor, Single, Stage, Stator, Suction, Surface, Turbine, Velocity, Weight.

For abstract, see STAR 05 18.
N67-31918 HC$3.00 MF$0.65

EXPERIMENTAL INVESTIGATION OF THE PARTIAL- ADMISSION PERFORMANCE CHARACTERISTICS OF A SINGLE-STAGE MACH 2 SUPERSONIC TURBINE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
F. W. Klag, Jr., and T. P. Moffitt. Sep 59, 15p NASA-TM-X-80

Descriptors: *Nozzle efficiency, *Supersonic turbine, Admission, Characteristics, Efficiency, Nozzle, Partial, Performance, Pressure, Ratio, Rotor, Single, Specific, Stage, Static, Supersonic, Turbine, Work.

For abstract, see STAR 05 18.
N67-32157 HC$3.00 MF$0.65

21H. Rocket Motors and Engines

THE COMBUSTION OF POROUS ALUMINUM PLUGS WITH OXYGEN THROUGHOUT.
Stevens Inst of Tech Hoboken N J Dept of Mechanical Engineering
For primary bibliographic entry see Field 21B.
AD-656 762 HC$3.00 MF$0.65

EXPERIMENTAL INVESTIGATION OF BASE HEATING AND ROCKET HINGE MOMENTS FOR A SIMULATED MISSILE THROUGH A MACH NUMBER RANGE OF 0.8 TO 2.0.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
B. G. Chiccine, A. M. Shinn, and A. S. Valerino. Oct 59, 29p NASA-TM-X-82

Descriptors: *Ballistic missile, *Jet mixing, *Jp-4 jet fuel, *Liquid oxygen (lox), *Rocket engine, Aerodynamics, Afterbody, Ballistics, Base, Flow, Fuel, Heating, Hinge, Interaction, Jet, Liquid, Missile, Mixing, Moment, Oxygen, Pressure, Simulation, Stream, Temperature, Tunnel, Wind.

For abstract, see STAR 05 18.
N67-31731 HC$3.00 MF$0.65

21I. Rocket Propellants

A CRITICAL ANALYSIS OF ARC IMAGE IGNITION OF SOLID PROPELLANTS,
Princeton Univ N J Dept of Aerospace and Mechanical Sciences
M. Summerfield, and T. J. Ohlemiller. Jul 67, 45p Rept no. AMS-789
AFOSR-67-1534
Contract AF 49 (638)-1267

Descriptors: (*Solid rocket propellants, *Ignition), Test methods, Thermal radiation, Thermochemistry, Photochemistry, Oxidation, Theory, Differential equations.
Identifiers: Arc-image furnaces.

The arc image furnace is used widely for evaluating solid propellant ignition characteristics, but the applicability of such data to rocket motors is questionable. In arc image testing, radiation replaces the normal conductive and convective heating modes that exist in rocket motor ignition; radiation interacts with the propellant in a basically different way. Thus, for example, because radiation is absorbed in depth, the ignition delay is sensitive to propellant opacity. In addition, radiation can cause subsurface disruption of the propellant. A physical model is proposed in which incident radiation penetrates the propellant and is absorbed, causing thermal and photochemical decomposition and a temperature increase. Oxidative reactions start either in the gaseous boundary layer or on the surface and, by thermochemical action, lead to a flame. The system of differential equations for this complete model is complicated and has not been solved. However, an equivalent model of simpler character is solved, and an equation is produced for the ignition time delay as a function of radiation intensity, pressure, and physico-chemical properties. The qualitative behavior of experimental radiative ignition data reported by Beyer and Fishman and by Bastress is explained by this theory. (Author)
AD-655 919 HC$3.00 MF$0.65

STUDIES RELATED TO THERMOVISCOELASTIC STRESS ANALYSIS OF HIGHLY-LOADED SOLID PROPELLANT.
Final technical rept. 1 Dec 65-30 Sep 66,
Purdue Univ Lafayette Ind School of Aeronautics Astronautics and Engineering Sciences
R. A. Schapery, J. P. Vogt, and L. E. Clemmer. Feb 67, 134p Rept no. AA/ES-66-6
AFRPL-TR-67-106
Contract AF 04 (611)-11371

Descriptors: (*Solid rocket propellants, Viscoelasticity), Loading (Mechanics), Stresses, Analysis, Compressive properties, Thermodynamics, Rocket propellant grains, Ignition, Pressure.

The report covers studies which account for realistic solid propellant properties, including nonlinear viscoelastic behavior, in the structural analysis of idealized configurations under slow cooling and ignition pressurization. First, approximate linear viscoelasticity solutions are given which illustrate certain essential features of propellant structural response, and demonstrate the applicability of quasi-elastic solutions. Specific nonlinear constitutive equations, for both mechanically compressible and incompressible materials, are then derived from a thermodynamic theory. An experimental program and data reduction scheme for evaluation of material properties is discussed. Application of nonlinear theory is made to long, hollow, case-bonded cylinders using actual propellant properties, and linear and nonlinear solutions are compared numerically. (Author)
AD-656 347 HC$3.00 MF$0.65

SOLID ROCKET PROPELLANTS,
Foreign Technology Div Wright-Patterson AFB Ohio
A. I. Silantev. 24 Apr 67, 66p Rept no. FTD-MT-65-504
TT-67-62513
Edited machine trans. of mono. Tverdye Raketnye Topliva, Moscow, 1964 77p.

Descriptors: (*Solid rocket propellants, Reviews), Nitrocellulose, Hybrid rocket propellants, Rocket propellant grains, Physical properties, Mechanical properties, Chemical properties, Ignition, Combustion, Burning rate, Erosive burning, Energy, Specific impulse, Thrust, USSR.

The pamphlet is devoted to a semitechnical description of the compositions of rocket propellants, their energy (power) characteristics, and operational properties.
AD-656 567 HC$3.00 MF$0.65

THERMAL RADIATION OF HIGH-TEMPERATURE COMBUSTION PRODUCTS.
Bell Aerosystems Co Buffalo N Y
For primary bibliographic entry see Field 21B.
AD-656 775 HC$3.00 MF$0.65

FEASIBILITY STUDY OF OXYGEN/HYDROGEN POWDERED METAL IGNITION FINAL REPORT, 16 SEP. 1964 - 15 SEP. 1965.
Marquardt Corp., Van Nuys, Calif.
W. B. Lee. 1 Sep 65, 82p NASA-CR-68773, REPT.-25179
Contract NAS8-11250

Descriptors: *Hydrogen, *Ignition, *Oxygen, *Powdered metal, Adsorption, Atom, Energy, Feasibility, Gas, Injector, Liquid, Metal, Molecule, Nickel, Platinum, Powder, Rocket engine, Sensing, Temperature.

For abstract, see STAR 05 18.
N67-31967 HC$3.00 MF$0.65

22. SPACE TECHNOLOGY

RADIOLOGICAL SAFETY STUDIES OF SPACE NUCLEAR SYSTEMS.

Quarterly rept. no 1, 13 Sep-13 Dec 66,
Nus Corp., Washington, D. C.
J. R. Coleman, and R. S. Denham. Jan 67, 39p
Contract 48-4310

Descriptors: (*Radioactive isotopes, *Fuels), (*Reentry vehicles, Safety), Atmosphere entry.

For abstract, see NSA 21 15.
SC-CR-66-2144 HC$3.00 MF$0.65

22A. Astronautics

OBSERVATIONS OF THE INTERPLANETARY MAGNETIC FIELD JULY 4-12, 1966.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
N. F. Ness, and H. E. Taylor. Jul 67, 21p NASA-TM-X-55842, X-612-67-345
Presented At the London Cospar Proton Flare Proj., 27-28 Jul. 1967

Descriptors: *Cislunar space, *Explorer xxxiii satellite, *Interplanetary magnetic field, *Magnetometry, *Pioneer vi space probe, Cislunar, Commencement, Energetic, Explorer xxviii satellite, Field, Flux, Interplanetary, Magnetic, Particle, Shock, Space, Sudden, Wave.

For abstract, see STAR 05 18.
N67-31549 HC$3.00 MF$0.65

EARLY RESULTS FROM THE MAGNETIC FIELD EXPERIMENT ON LUNAR EXPLORER 35.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
K. W. Behannon, S. C. Canterano, N. F. Ness, and C. S. Scearce. Jul 67, 32p NASA-TM-X-55847, X-612-67-355

Descriptors: *Electric conductivity, *Explorer satellite, *Lunar magnetic field, Bow, Capture, Conductivity, Diffusion, Earth, Electric, Field, Line, Lunar, Magnetic, Magnetometer, Moment, Shock, Tail, Wave.

For abstract, see STAR 05 18.
N67-31810 HC$3.00 MF$0.65

PRELIMINARY DESIGN STUDY OF A LUNAR GRAVITY SIMULATOR INTERIM REPORT.
Lockheed Missiles and Space Co., Huntsville, Ala. Huntsville Research and Engineering Center.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 05 18.
N67-31857 HC$3.00 MF$0.65

SPACE PROGRAMS SUMMARY NO. 37-45, VOLUME VI FOR THE PERIOD MARCH 1, 1967 TO APRIL 30, 1967. SPACE EXPLORATION PROGRAMS AND SPACE SCIENCES.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
31 May 67, 31p NASA-CR-86607, JPL-SPS-37-45, VOL. VI
Contract NAS7-100

Descriptors: *Deep space network (dsn), *Lunar program, *Planetary-interplanetary program, *Space exploration, Advance, Assurance, Communication, Deep, Development, Dynamic, Environment, Exploration, Facility, Flight, Instrumentation, Interplanetary, Lunar, Manned, Mariner program, Mars project, Network, Operation, Planetary, Program, Quality, Reliability, Science, Space, Support, Surveyor project, Test, Unmanned, Venus probe.

For abstract, see STAR 05 18.
N67-32257 HC$3.00 MF$0.65

SOMETHING NEW ABOUT VENUS.
Novoye O Venere
Volt Technical Corp., Washington, D. C.
D. Martynov. 22 Jun 67, 4p NASA-CR-86635, ST-PR-LPS-10 628
Contract NAS5-12487
Transl. Into English From Pravda (Moscow), No. 165, 1967

Descriptors: *Cloud cover, *Planetary temperature, *Venus atmosphere, Atmosphere, Cloud, Cosmic, Cover, Day, Effect, Flyby, Greenhouse, Length, Planetary, Probe, Rocket, Space, Temperature, Venus.

For abstract, see STAR 05 18.
N67-32308 HC$3.00 MF$0.65

LUNAR ORBITER I - PHOTOGRAPHY.
Boeing Co., Seattle, Wash.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 18.
N67-32334 HC$3.00 MF$0.65

VENUS - PRELIMINARY SCIENCE OBJECTIVES AND EXPERIMENTS FOR USE IN ADVANCED MISSION STUDIES.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
F. T. Barath, R. G. Brereton, W. E. Brown, R. W. Davies, and C. E. Giffin. 1 Aug 66, 29p NASA-CR-86667, JPL-TM-33-282, REV. 1
Contract NAS7-100
Revision 1

Descriptors: *Experiment design, *Mariner space probe, *Mission planning, *Venus, Accelerometer, Atmospheric, Biology, Chamber, Composition, Design, Experiment, Field, Flyby, Impact, Ionization, Magnetic, Map, Microwave, Mission, Particle, Photometry, Planetology, Planning, Plasma, Proton, Radar, Solar, Spectroscopy, Surface, Thermal, Thermodynamics, Ultraviolet.

For abstract, see STAR 05 18.
N67-32377 HC$3.00 MF$0.65

BUOYANT VENUS STATION FEASIBILITY STUDY. VOLUME I - SUMMARY AND PROBLEM IDENTIFICATION FINAL REPORT.
Martin Co., Denver, Colo.
J. F. Baxter. Jul 67, 53p NASA-CR-66404
Contract NAS1-6607

Descriptors: *Inflatable spacecraft, *Venus probe, Atlas centaur launch vehicle, Atmosphere, Buoyancy, Deployment, Feasibility, Science, Venus.

For abstract, see STAR 05 18.
N67-32388 HC$3.00 MF$0.65

BUOYANT VENUS STATION FEASIBILITY STUDY. VOLUME II - MODE MOBILITY STUDIES FINAL REPORT.
Martin Co., Denver, Colo.
J. F. Baxter, and R. E. Frank. Jul 67, 93p NASA-CR-66405
Contract NAS1-6607

Descriptors: *Balloon, *Inflatable spacecraft, *Parachute, *Venus probe, Atmosphere, Buoyancy, Deployment, Fabric, Inflatable, Probe, Spacecraft, Venus.

For abstract, see STAR 05 18.
N67-32389 HC$3.00 MF$0.65

BUOYANT VENUS STATION FEASIBILITY STUDY. VOLUME III - INSTRUMENTATION STUDY FINAL REPORT.
Martin Co., Denver, Colo.
A. R. Barger, and J. F. Baxter. 1967, 184p
NASA-CR-66406
Contract NAS1-6

Descriptors: *Inflatable spacecraft, *Instrumentation, *Venus probe, Atmospheric, Buoyancy, Circulation, Inflatable, Probe, Sonde, Spacecraft, Trajectory, Venus.

For abstract, see STAR 05 18.
N67-32390 HC$3.00 MF$0.65

BUOYANT VENUS STATION FEASIBILITY STUDY. VOLUME IV - COMMUNICATIONS AND POWER FINAL REPORT.
Martin Co., Denver, Colo.
J. F. Baxter, J. D. Pettus, and A. A. Sorenson. Jul 67, 67p NASA-CR-66407
Contract NAS1-6607

Descriptors: *Inflatable spacecraft, *Spacecraft power supply, *Telecommunication, *Venus probe, Battery, Command, Control, Generator, Inflatable, Integration, Link, Power, Probe, Spacecraft, Supply, Thermoelectric, Tradeoff, Venus.

For abstract, see STAR 05 18.
N67-32391 HC$3.00 MF$0.65

BUOYANT VENUS STATION FEASIBILITY STUDY. VOLUME V - TECHNICAL ANALYSIS OF A 200-POUND BVS FINAL REPORT.
Martin Co., Denver, Colo.
A. R. Barger, J. F. Baxter, R. E. Frank, J. D. Pettus, and A. A. Sorensen. Jul 67, 60p NASA-CR-66408
Contract NAS1-6607

Descriptors: *Atlas centaur launch vehicle, *Inflatable spacecraft, *Venus probe, Balloon, Buoyancy, Inflatable, Instrumentation, Launch vehicle, Power, Probe, Science, Spacecraft, Subsystem, Telecommunication, Thermal, Venus.

For abstract, see STAR 05 18.
N67-32392 HC$3.00 MF$0.65

SURVEYOR III A PRELIMINARY REPORT.
National Aeronautics and Space Administration, Washington, D. C.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 18.
N67-32582 HC$3.00 MF$0.65

22B. Spacecraft

WIRE AND CABLE INSULATION PROBLEMS OF SPACE VEHICLES,
Lockheed Missiles and Space Co Sunnyvale Calif
For primary bibliographic entry see Field 11G.
AD-656 096 HC$3.00 MF$0.65

SATELLITE OBSERVATIONS OF PARTICLE FLUXES AND ATMOSPHERIC EMISSIONS,
Rice Univ Houston Tex Dept of Space Science
For primary bibliographic entry see Field 20H.
AD-656 250 Not available from CFSTI.

ANTENNA BREAKDOWN IN HIGH-TEMPERATURE AIR,
Aerospace Corp El Segundo Calif Labs Div
For primary bibliographic entry see Field 9E.
AD-656 336 HC$3.00 MF$0.65

TEXAS BIANNUAL OF ELECTRONICS RESEARCH, NO. 5.
Texas Univ Austin Labs for Electronics and Re-

lated Science Research
For primary bibliographic entry see Field 9C.
AD-656 349 HC$3.00 MF$0.65

A REVIEW OF SEVEN PAPERS CONCERNING THE MEASUREMENT OF TEMPERATURE IN THE STRATOSPHERE AND MESOSPHERE,
Atmospheric Sciences Lab White Sands Missile Range N Mex
For primary bibliographic entry see Field 4A.
AD-656 461 HC$3.00 MF$0.65

INVESTIGATION OF ABLATION EFFECTS ON HYPERSONIC DYNAMIC STABILITY OF A 10 DEG. CONE.
LTV Aerospace Corp Dallas Tex LTV Vought Aeronautics Div
For primary bibliographic entry see Field 20D.
AD-656 492 HC$3.00 MF$0.65

ELECTRON ATTACHING ADDITIVES FOR THE MODIFICATION OF RE-ENTRY PLASMAS,
Space Sciences Inc Waltham Mass
Sander E. Nydick, and Sol Aisenberg. 17 Mar 67, 37p Rept no. SSI-290-SR-1
AFCRL-67-0214
Contract AF 19 (628)-5097

Descriptors: (*Reentry vehicles, *Plasma sheath), (*Microwave communication systems, Reentry vehicles), Electron density, Chemicals, Additives, Plasma physics, Carbon tetrachloride, Dissociation, Temperature, Energy, Molecules, Thermodynamics.

The report is part of an analytical and experimental program to investigate the enhancement of microwave communication by employing small quantities of chemical additives introduced into the plasma sheath of a re-entry vehicle and to deduce the optimum types and forms of additives to be used. An analytical investigation has shown that electron attachment to electrophylic molecules is one of the more important mechanisms in reducing the plasma free electron concentration and thereby in alleviating the re-entry sheath blackout problem. The attachment cross section data necessary for the theoretical selection of the more effective additives is not always available in the literature. An analysis is presented here, where attachment cross sections are correlated with more readily available fundamental thermodynamic data so that attachment data can be predicted. Qualitative reasoning based upon the potential energy diagram concept is employed to describe the physics of electron attachment and to derive graphical correlations between the more readily obtained thermodynamic values and the attachment cross-section parameters. Average attachment rate constants are also calculated for molecules from data in the literature. The attachment rate constant can be employed as a figure of merit to determine the most efficient additive, for the limiting case of negligible dissociation. The results show that carbon tetrachloride is the most efficient of the compounds investigated and is potentially at least two orders of magnitude better than water for moderate plasma temperatures. (Author)
AD-656 494 HC$3.00 MF$0.65

THE SPACE PROGRAMS OF THE SOVIET UNION,
Rand Corp Santa Monica Calif
F. J. Krieger. Jul 67, 17p Rept no. P-3632
Presented at the Aerospace Science Workshop, Beverly Hills, Calif., 25 Jul 67.

Descriptors: (*Spacecraft, *Scheduling), (*Manned spacecraft, *Space flight), (*Scientific research, *Satellites (Artificial)), Lunar probes, Space communication systems, Meteorological radar, Space probes, Meteorological charts, Mapping, USSR.

The following programs can be identified from published information on the missions pertaining to the different spacecraft: Manned flight by means of Vostok, Voskhod, and Soyuz spacecraft; Lunar flight by means of Luna probes; Interplanetary flight by means of Venus, Mars, and Zond probes; Scientific research by means of Cosmos, Electron, and Proton spacecraft; Communications development by means of Molniya satellites; Weather mapping by means of Molniya and Cosmos satellites; Technological development by means of Cosmos, Polyot, Proton, and Soyuz spacecraft.
AD-656 546 HC$3.00 MF$0.65

SELF-RIGIDIZING EXPANDABLE-SANDWICH AEROSPACE SHELTERS AND SOLAR COLLECTORS.
Progress rept. for 15 May 66.
Archer Daniels Midland Co Minneapolis Minn
15 May 66, 30p
Contract AF 33 (615)-2435
See also AD-489 454.

Descriptors: (*Expandable structures, *Sandwich construction), (*Solar collectors, Expandable structures), (*Space stations, Expandable structures), Honeycomb cores, Feasibility studies, Mirrors, Parabolic bodies, Packaging, Environmental tests, Radiation damage, Plastics.

The objectives of the program are: (1) fabrication, space deployment, and rigidification of a large parabolic solar collector; (2) fabrication and space deployment of inflatable, rigidizable space shelter structures. The first 10-foot diameter mirror was completed by addition of the plumbing attachments to the manifold for the rigidization task. However, due to some slight leakage between the inflated sandwich and mirror shell coat, it was decided that this unit will be rigidized in ambient conditions. The 4-foot diameter x 8-foot long cylinder was completed, including impregnation. However, deployment in the vacuum chamber was unsuccessful because the resin had already rigidified.
AD-656 747 HC$3.00 MF$0.65

FULL-SCALE FLIGHT TEST FROM SEA LEVEL OF AN ABORT-ESCAPE SYSTEM FOR A PROJECT MERCURY CAPSULE.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
W. S. Blanchard, Jr., and J. L. Raper. Oct 60, 44p NASA-TM-X-422

Descriptors: *Abort apparatus, *Escape capsule, *Flight test, *Mercury capsule, Abort, Apparatus, Capsule, Drogue, Escape, Flight, Manned, Parachute, Safety, System, Test.

For abstract, see STAR 05 18.
N67-31527 HC$3.00 MF$0.65

STUDY OF PLASMA RADIATION SHIELDING QUARTERLY PROGRESS REPORT, 24 MAR. - 23 JUN. 1967.
Avco-everett Research Lab., Everett, Mass.
Jul 67, 35p NASA-CR-86614
Contract NAS8-20310

Descriptors: *Radiation shielding, *Research project, *Solenoid, *Spacecraft shielding, Amplitude, Charge distribution, Current, Frequency, Project, Radiation, Research, Shielding, Spacecraft.

For abstract, see STAR 05 18.
N67-31654 HC$3.00 MF$0.65

PRESSURE AND HEAT-TRANSFER MEASUREMENTS ON A MERCURY CAPSULE MODEL.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
J. O. Reller, Jr., and H. L. Seegmiller. May 62, 85p NASA-TM-X-647

Descriptors: *Convective heat transfer, *Mercury capsule, *Surface pressure, Afterbody, Air, Angle of attack, Chemical, Configuration, Convection, Distribution, Enthalpy, Equilibrium, Field, Flight, Flow, Free, Heat, Heat transfer, Model, Point, Pressure, Reentry, Separation, Shield, Shock, Stagnation, Stream, Surface, Tunnel, Wind.

For abstract, see STAR 05 18.
N67-31809 HC$3.00 MF$0.65

PRESSURE AND HEAT-TRANSFER DISTRIBUTION ON THE AFTERBODY OF A LIFTING MERCURY- TYPE CAPSULE AT MACH NUMBER 15 IN HELIUM.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
J. G. Marvin. Apr 63, 31p NASA-TM-X-783

Descriptors: *Afterbody, *Flow distribution, *Heat transfer, *Helium, *Mercury capsule, *Shock wave, Air, Angle, Attack, Blowdown, Distribution, Flow, Hypersonic, Laminar, Lifting, Model, Pressure, Reynolds number, Shock, Stainless, Steel, Tunnel, Wave, Wind.

For abstract, see STAR 05 18.
N67-31920 HC$3.00 MF$0.65

FLIGHT TEST OF A LITTLE JOE BOOSTED FULL- SCALE SPACECRAFT MODEL AND ESCAPE SYSTEM FOR PROJECT MERCURY.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
H. T. Baber, Jr., H. S. Carter, and R. D. English. May 62, 53p NASA-TM-X-629

Descriptors: *Escape capsule, *Flight test, *Little joe ii launch vehicle, *Mercury project, Aid, Capsule, Entry, Escape, Flight, Model, Motion, Performance, Recovery, Rhesus, Spacecraft, System, Test.

For abstract, see STAR 05 18.
N67-31979 HC$3.00 MF$0.65

CONCEPTUAL MECHANIZATION STUDIES FOR A HORIZON DEFINITION SPACECRAFT ELECTRICAL POWER SUBSYSTEM.
Gulton Industries, Inc., Metuchen, N. J. Honeywell, Inc., Minneapolis, Minn. Spectrolab, Inc., Sylmar, Calif. Systems and Research Div.
J. J. Baltes, F. E. Betz, J. A. Coux, J. D. Gum, and D. J. Hartman. May 67, 175p NASA-CR-66378
Contract NAS1-6010
Prepared Jointly With Gulton Industries, Inc., and Spectrolab, Inc.

Descriptors: *Horizon project, *Solar cell, *Spacecraft power supply, Array, Battery, Cell, Configuration, Electric, Panel, Power, Solar, Spacecraft, Subsystem, Supply, Utilization.

For abstract, see STAR 05 18.
N67-32006 HC$3.00 MF$0.65

CONCEPTUAL MECHANIZATION STUDIES FOR A HORIZON DEFINITION SPACECRAFT STRUCTURES AND THERMAL SUBSYSTEM.
Honeywell, Inc., Minneapolis, Minn. Systems and Research Div.
R. M. Jansson, C. A. Jensen, D. C. Peterson, and I. W. Russell. May 67, 140p NASA-CR-66380
Contract NAS1-6010

Descriptors: *Horizon project, *Spacecraft configuration, *Thermal environment, Configuration, Control, Cooling, Cylinder, Delta launch vehicle, Environment, Hexagon, Panel, Radiation, Solar, Spacecraft, Spin, Stabilization, Subsystem, Thermal.

For abstract, see STAR 05 18.
N67-32007 HC$3.00 MF$0.65

WIND-TUNNEL INVESTIGATION AT MACH NUMBERS FROM 3.0 TO 6.8 OF THE STATIC AERODYNAMIC CHARACTERISTICS OF MODIFIED MERCURY EXIT AND ESCAPE CAPSULE CONFIGURATIONS.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A. O. Pearson. Sep 60, 19p NASA-TM-X-324

Descriptors: *Aerodynamic characteristics, *Escape capsule, *Mercury project, *Static stability, Aerodynamic, Axial, Capsule, Configuration, Escape, Exit, Force, Hypersonic, Mercury, Model, Modification, Moment, Normal, Pitch, Project, Stability, Static, Trim, Tunnel, Wind.

For abstract, see STAR 05 18.
N67-32016 HC$3.00 MF$0.65

WIND-TUNNEL INVESTIGATION AT MACH NUMBERS FROM 0.60 TO 1.20 OF THE STATIC AERODYNAMIC CHARACTERISTICS OF A MODEL OF A POSSIBLE NONLIFTING REENTRY CAPSULE IN COMBINATION WITH A ROCKET BOOSTER.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A. O. Pearson. Sep 60, 16p NASA-TM-X-318

Descriptors: *Aerodynamic characteristics, *Nonlifting vehicle, *Reentry body, *Static stability, Aerodynamic, Alloy, Aluminum, Angle, Attack, Body, Booster, Booster rocket, Capsule, Configuration, Escape, Model, Nonlifting, Reentry, Rocket, Stability, Static, Subsonic, Tower, Transonic, Tunnel, Vehicle, Wind.

For abstract, see STAR 05 18.
N67-32018 HC$3.00 MF$0.65

CONCEPTUAL MECHANIZATION STUDIES FOR A HORIZON DEFINITION SPACECRAFT ATTITUDE CONTROL SUBSYSTEM, PHASE A, PART II, 10 OCTOBER 1966 - 29 MAY 1967.
Honeywell, Inc., Minneapolis, Minn. Systems and Research Div.
For primary bibliographic entry see Field 17G.
For abstract, see STAR 05 18.
N67-32090 HC$3.00 MF$0.65

GSFC PHASE A ANALYTICAL REPORT FOR ATS-F AND G.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
H. L. Gerwin. Feb 67, 295p NASA-TM-X-55837, X-730-67-118

Descriptors: *Applications technology satellite (ats), *Radio antenna, *Space vehicle, Antenna, Communications, Configuration, Feed, Frequency, Launch vehicle, Parabola, Power, Propulsion, Radio, Reflector, S-band, Satellite, Technology, Telemetry, Thermal, Ultrahigh, X-band.

For abstract, see STAR 05 18.
N67-32118 HC$3.00 MF$0.65

A NEW METHOD OF APPROACHING THE DESIGN OF SOUNDING ROCKETS.
Su Un Nuovo Metodo Per l'Impostazione Del Progetto Dei Missili Sonda
National Aeronautics and Space Administration, Washington, D. C.
E. Gismondi. Jul 67, 37p NASA-TT-F-489
Transl. Into English of the Spanish Presented At the Xiii Intern. Telecomun. Meeting, Geneva, 12-16 Oct. 1965

Descriptors: *Engine design, *Performance characteristics, *Sounding rocket, Calculation, Characteristic, Design, Engine, Method, Parameter, Performance, Rocket, Sounding.

For abstract, see STAR 05 18.
N67-32123 HC$3.00 MF$0.65

EFFECTIVENESS OF SEVERAL CONTROL ARRANGEMENTS ON A MERCURY-TYPE CAPSULE.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
R. R. Dickey, and R. I. Sammonds. Oct 61, 35p NASA-TM-X-579

Descriptors: *Aerodynamic characteristics, *Control system, *Mercury capsule, Aerodynamic, Capsule, Characteristic, Control, Dynamic, Effectiveness, Flap, Mercury, Stability, Static, System, Trim.

For abstract, see STAR 05 18.
N67-32136 HC$3.00 MF$0.65

SPACECRAFT TECHNOLOGY. VOLUME V - SPACE ENVIRONMENT.
European Space Research Organization, Paris (France).
Dec 66, 224p ESRO-SP-13
Proc. of 2d Esro Summer School, Oxford, 1964

Descriptors: *Conference, *Corpuscular radiation, *Meteoritic damage, *Spacecraft environment, *Thermal environment, *Vacuum equipment, *Weightlessness, Corpuscular, Damage, Environment, Equipment, Geomagnetic, Meteorite, Radiation, Simulation, Solar, Spacecraft, Thermal, Vacuum.

For abstract, see STAR 05 18.
N67-32181 HC$3.00 MF$0.65

AIMP-I EXPLORER XXXII SECOND INTERIM FLIGHT REPORT.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
J. J. Madden. May 67, 40p NASA-TM-X-55838, X-724-67-223

Descriptors: *Explorer xxxiii satellite, *Performance characteristics, *Spacecraft orbit, Anchored interplanetary monitoring platform, Angle, Anomaly, Axis, Battery, Characteristics, Element, Explorer satellite, Failure, Orbit, Performance, Prediction, Rate, Spacecraft, Spin, Sun, Table.

For abstract, see STAR 05 18.
N67-32307 HC$3.00 MF$0.65

LUNAR ORBITER I - PHOTOGRAPHY.
Boeing Co., Seattle, Wash.
Aug 67, 125p NASA-CR-847, D2-100727-2
Contract NAS1-3800

Descriptors: *Lunar orbiter, *Photograph interpretation, Analysis, Interpretation, Landing, Lunar, Mission, Orbit, Photograph, Reconstruction, Site, Surface.

For abstract, see STAR 05 18.
N67-32334 HC$3.00 MF$0.65

EQUILIBRIUM ANALYSIS AND ITS APPLICATION TO ATTITUDE CONTROL SYSTEMS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
W. N. Redisch. Aug 67, 127p NASA-TR-R-270
Contract 879-40-01-05-51

Descriptors: *Attitude control, *Computer simulation, *Equilibrium, *Spacecraft stability, Attitude, Computer, Control, Cycle, Differential, Equation, Grid, Limit, Nonlinear, Point, Simulation, Space, Spacecraft, Stability, State, Theorem, Vector.

For abstract, see STAR 05 18.
N67-32339 HC$3.00 MF$0.65

SYSTEM ANALYSIS AND INTEGRATION STUDIES FOR A 15-MICRON HORIZON RADIANCE MEASUREMENT EXPERIMENT.
Honeywell, Inc., Minneapolis, Minn. Systems and Research Div.
H. W. Berry, and W. E. Eckstrom. May 67, 171p NASA-CR-66377
Contract NAS1-6010

Descriptors: *Experiment design, *Infrared horizon, *Systems analysis, Analysis, Design, Experiment, Horizon, Infrared, Integration, Measurement, Operation, Plan, Radiance, System.

For abstract, see STAR 05 18.
N67-32500 HC$3.00 MF$0.65

SURVEYOR III A PRELIMINARY REPORT.
National Aeronautics and Space Administration, Washington, D. C.
Jun 67, 170p NASA-SP-146

Descriptors: *Landing site, *Lunar surface, *Sampling device, *Surface property, *Surveyor iii spacecraft, Adhesion, Bearing, Brightness, Crater, Data, Density, Depth, Device, Electricity, Grain, Impact, Landing, Layer, Lunar, Measurement, Mechanical, Particle, Photograph, Physics, Property, Quartz, Radar, Site, Soil, Spacecraft, Surface, Telemetry, Temperature.

For abstract, see STAR 05 18.
N67-32582 HC$3.00 MF$0.65

22C. Spacecraft Trajectories and Reentry

A FINITE-DIFFERENCE METHOD SOLUTION OF NON-SIMILAR, EQUILIBRIUM AND NON-EQUILIBRIUM AIR, BOUNDARY LAYER EQUATIONS WITH LAMINAR AND TURBULENT VISCOSITY MODELS. PART I. ANALYSIS.
General Applied Science Labs., Inc., Westbury, N. Y.
For primary bibliographic entry see Field 1A.
AD-474 645 HC$3.00 MF$0.65

GEOPS.
Army Engineer Geodesy Intelligence and Mapping Research and Development Agency Fort Belvoir Va
For primary bibliographic entry see Field 8E.
AD-655 852 HC$3.00 MF$0.65

ORBITS IN THE COPENHAGEN PROBLEM ASYMPTOTIC AT L4, AND THEIR GENEALOGY,
Yale Univ New Haven Conn Observatory
J. M. A. Danby. 11 Nov 66, 5p
AFOSR-67-1662
Contract Nonr-609 (50), Grant AF-AFOSR-397-67
Availability: Published in Astronomical Journal v72 n2 p198-201 Mar 1967.

Descriptors: (*N-body problem, *Orbital trajectories), Periodic variations, Stability, Convergence, Curve fitting.
Identifiers: Copenhagen problem.

The genealogy of a class of pear-shaped orbits, for which a limiting member was given by Stromgren, is described, together with its linear stability characteristics and its branching with Stromgren's class c. A method is described, independent of that

used by Stromgren, for looking for nearly asymptotic orbits. (Author)
AD-655 963 Not available from CFSTI.

ON APPROXIMATING A PERIODIC ATMOSPHERIC DRAG FUNCTION FOR SATELLITES BY A PIECEWISE CONSTANT FUNCTION.
Technical rept.,
Naval Weapons Lab Dahlgren Va
Bernd Zondek. 24 May 67, 17p Rept no. NWL-2090

Descriptors: (*Satellites (Artificial), *Circular orbit trajectories), Least squares method, Gravity, Perturbation theory, Drag, Atmosphere, Mathematical analysis.

A satellite is affected by periodic drag fluctuations. We approximate the periodic drag by a step function. We calculate the standard deviation in the satellite's coordinates due to this approximation. The results permit us to estimate the time over which we may keep the drag coefficient constant so as to achieve any desired degree of signal reduction. We confine ourselves to circular orbits. Numerical results are given for a 90 minute satellite and a drag to gravity ratio of 2 x 10 to the -8th power. (Author)
AD-656 086 HC$3.00 MF$0.65

THE SEPARATE COMPUTATION OF ARCS FOR OPTIMAL FLIGHT PATHS WITH STATE VARIABLE INEQUALITY CONSTRAINTS.
Harvard Univ Cambridge Mass Div of Engineering and Applied Physics
For primary bibliographic entry see Field 12A.
AD-656 394 HC$3.00 MF$0.65

A NEIGHBORING OPTIMUM FEEDBACK CONTROL SCHEME BASED ON ESTIMATED TIME-TO-GO WITH APPLICATION TO RE-ENTRY FLIGHT PATHS.
Technical rept.,
Harvard Univ Cambridge Mass Div of Engineering and Applied Physics
Jason L. Speyer, and Arthur E. Bryston, Jr. Jun 67, 47p Rept no. TR-527
Contract Nonr-1866 (16), Grant NGR-22-007-068

Descriptors: (*Descent trajectories, Guidance), (*Gliders, *Atmosphere entry), Feedback, Control, Perturbation theory, Calculus of variations, Matrix algebra, Flight paths, Optimization, Equations of motion, Iterative methods.

A modification of the perturbation feedback control scheme given in other references is presented that greatly increases its capability to handle disturbances in cases where the final time is not specified. The modified control scheme uses a set of precalculated gains which allows in-flight estimation of the change in the final time due to perturbations from a nominal path. The time-to-go, determined from the predicted change in final time, is used to enter tables of precalculated feedback control gains. This modified guidance scheme is applied to a re-entry glider entering the atmosphere of the Earth at supercircular velocities. Beginning at the bottom of the pull-up maneuver (nominal altitude 188,000 ft., nominal velocity 33,000 ft./sec. to the -1 power) the glider is guided to a terminal altitude of 220,000 ft. and zero (0) flight path angle with maximum terminal velocity. For initial altitudes between 167,000 and 216,000 ft. the terminal error in altitude is less than two feet; for initial velocities between 23,000 ft./sec. and 43,000 ft./sec. the terminal altitude error is less than 13 ft. In addition, the terminal velocity is very close to optimal for these initial conditions.
AD-656 395 HC$3.00 MF$0.65

PERFORMANCE OF THE SPIN CONTROL SYSTEM OF THE DME-A SATELLITE.
Technical memo.,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
F. F. Mobley, J. W. Teener, R. D. Brown, and B. E. Tossman. Jun 67, 23p Rept no. TG-929
Contract NOw-62-0604

Descriptors: (*Scientific satellites, Attitude control systems), (*Attitude control systems, Performance (Engineering)), (*Spin stabilization, Scientific satellites), Control systems, Orbital trajectories, Maneuvering satellites, Spin, Magnets.

The Direct Measurement Explorer-A (DME-A) satellite was launched in November 1965 into a near-earth orbit ranging between altitudes of 500 and 3000 km to sample and measure charged particles. The attitude control system is used to keep the spin axis aligned with the orbit normal and to maintain the spin rate. Spin axis control is achieved by a chargeable permanent magnet system which is operated upon command and reacts with the earth's field to produce precession of several degrees per minute. With this system the spin axis was kept within 10 degrees of the orbit normal for several weeks at a time, although larger deviations have been tolerated. The spin rate was observed to decay at 0.05 rpm per day. Periodic use of the spin rate control system has compensated for spin decay. This system is analogous to a DC motor in which the entire satellite is the armature. (Author)
AD-656 730 HC$3.00 MF$0.65

AN APPLICATION OF LINEAR PROGRAMMING TO MINIMUM FUEL OPTIMAL CONTROL.
California Univ., Berkeley. Dept. of Engineering.
C. M. Waespy. May 67, 159p NASA-CR-86654, REPT.-67-16
Grant NSG-237-62

Descriptors: *Linear programming, *Optimal control, Algorithm, Control, Decomposition, Equation, Fuel, Fuel control, Guidance, Linear, Minimum, Motion, Optimal, Programming, Rendezvous, Spacecraft, Trajectory.

For abstract, see STAR 05 18.
N67-31511 HC$3.00 MF$0.65

A COMPILATION OF WIND-TUNNEL HEAT-TRANSFER MEASUREMENTS ON THE AFTERBODY OF THE PROJECT MERCURY CAPSULE REENTRY CONFIGURATION.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
J. E. Swanson, and K. C. Weston. Aug 61, 31p NASA-TM-X-495

Descriptors: *Afterbody, *Heat transfer, *Mercury capsule, *Reentry body, Angle of attack, Body, Compilation, Configuration, Cylinder, Laminar, Measurement, Reentry, Tunnel, Turbulent, Wind.

For abstract, see STAR 05 18.
N67-31529 HC$3.00 MF$0.65

FULL-SCALE WIND-TUNNEL INVESTIGATION OF THE LOW-SPEED STATIC AERODYNAMIC CHARACTERISTICS OF A MODEL OF A REENTRY CAPSULE.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
W. I. Scallion. Oct 59, 10p NASA-TM-X-220

Descriptors: *Reentry vehicle, *Scale model, *Static aerodynamic characteristics, *Wind tunnel, Aerodynamic, Angle of attack, Canister, Capsule, Characteristics, Configuration, Corrugation, Diameter, Full, Low speed, Model, Reentry, Reynolds number, Scale, Stability, Static, Surface, Tunnel, Vehicle, Wind.

For abstract, see STAR 05 18.
N67-32155 HC$3.00 MF$0.65

FUNCTIONAL DESIGN OF THE MARINER MIDCOURSE MANEUVER OPERATIONS PROGRAM.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
H. J. Gordon. 15 Jul 67, 42p NASA-CR-86914, JPL-TR-32-1139
Contract NAS7-100

Descriptors: *Mariner space probe, *Midcourse guidance, *Mission planning, Command, Computation, Design, Function, Guidance, Midcourse, Mission, Operation, Planning, Probe, Program, Space, Spacecraft.

For abstract, see STAR 05 18.
N67-32320 HC$3.00 MF$0.65

THE USE OF RESONANT LIBRATING ORBITS IN SATELLITE GEODESY.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
C. A. Wagner. Aug 67, 30p NASA-TN-D-4081
Contract 188-48-01-05-51

Descriptors: *Geodetic satellite, *Harmonic motion, *Librational motion, *Orbiting satellite, Characteristics, Effect, Equation, Evolution, Geodesy, Harmonic, Libration, Motion, Resonant, Satellite.

For abstract, see STAR 05 18.
N67-32372 HC$3.00 MF$0.65

APPLICATION OF THE GRADIENT METHOD TO THE NUMERICAL STUDY OF LIMITED-POWER TRANSFERS BETWEEN NEAR-COPLANAR CIRCULAR ORBITS. COMPARISON WITH THE LINEARIZED SOLUTION.
Application de La Methode Du Gradient A l'Etude Numerique des Transferts A Puissance Limitee Entre Orbites Circulaires Coplanaires Proches. Comparaison Avec La Solution Linearisee
France. Office National D Etudes Et de Recherches Aerospatiales, Chatillon-sous-bagneux.
H. Girard. 1967, 91p ONERA-TN-112/1967/ in French, English Summary

Descriptors: *Circular orbit, *Power-limited vehicle, Circular, Coplanar, Gradient, Limit, Linear, Method, Numerical, Optimum, Orbit, Power, Propulsion, Solution, System, Trajectory, Transfer, Vehicle.

For abstract, see STAR 05 18.
N67-32577 HC$3.00 MF$0.65

22D. Spacecraft Launch Vehicles and Ground Support

REQUIREMENT STUDIES FOR THE LAUNCH VEHICLE AND SUPPORT FOR A HORIZON DEFINITION SPACECRAFT.
Honeywell, Inc., Minneapolis, Minn. Systems and Research Div.
J. O. Barrett, and R. T. Le Frois. May 67, 132p NASA-CR-66375
Contract NAS1-6010

Descriptors: *Flight vehicle, *Horizon project, *Support system, Configuration, Delta launch vehicle, Flight, Launch, Operation, Requirement, Spacecraft, Support, System, Vehicle.

For abstract, see STAR 05 18.
N67-31833 HC$3.00 MF$0.65

STATION AUTOMATION.
National Aeronautics and Space Administration.

Goddard Space Flight Center, Greenbelt, Md.
M. E. Shawe. Apr 66, 8p NASA-TM-X-55848, X-521-66-168

Descriptors: *Automation, *Ground station, *Satellite tracking, Communication, Data, Equipment, Ground, Maintenance, Network, Processing, Reliability, Satellite, Station, Testing, Tracking.

For abstract, see STAR 05 18.
N67-31873 HC$3.00 MF$0.65

PERFORMANCE CHARACTERISTICS OF THE LITTLE JOE LAUNCH VEHICLE.
National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
R. Kolenkiewicz, and J. C. Loughin. Sep 62, 74p NASA-TM-X-561

Descriptors: *Little joe ii launch vehicle, *Performance characteristics, Angle, Characteristics, Flight, Mercury project, Performance, Staging, Takeoff, Test, Time, Weight.

For abstract, see STAR 05 18.
N67-31978 HC$3.00 MF$0.65

LAUNCH-VEHICLE DYNAMICS.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A. G. Rainey, and H. L. Runyan, Jr.. Dec 61, 18p NASA-TM-X-607

Descriptors: *Launch vehicle, *Lunar flight, *Structural dynamics, Aerodynamic, Behavior, Design, Dynamics, Flight, Input, Load, Lunar, Mission, Problem, Stress, Structural, System.

For abstract, see STAR 05 18.
N67-32138 HC$3.00 MF$0.65

SOLAR PROBE WITH BURNER II PROPULSION MODULUS.
Sonnensonde Mit Burner Ii Antriebsmodul
National Aeronautics and Space Administration, Washington, D. C.
Aug 67, 17p NASA-TT-F-11214
Transl. Into English of Boelkow Gmbh Pamphlet Rf 77-st/A Ii 19 P

Descriptors: *Solar probe, *Solid propellant, *Specific impulse, Balance, Command, Destruction, Electric, Fuel, Guidance, Impulse, Mission, Modulus, Optimal, Orbit, Payload, Power, Probe, Profile, Propellant, Propulsion, Solar, Solid, Specific, Weight.

For abstract, see STAR 05 18.
N67-32338 HC$3.00 MF$0.65

PANEL FLUTTER STUDIES OF BOOST-VEHICLE FULL-SCALE FLIGHT INSULATION PANELS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
R. L. Greene, and M. L. Nacht. Aug 67, 17p NASA-TM-X-1417
Contract 891-05-00-01-22

Descriptors: *Centaur launch vehicle, *Flight test, *Panel flutter, *Supersonic wind tunnel, Aerodynamics, Cryogenics, Flutter, Insulation, Launch, Panel, Pressure, Resistance, Supersonic, Tank, Temperature, Tension, Test, Tunnel, Vehicle, Wind.

For abstract, see STAR 05 18.
N67-32552 HC$3.00 MF$0.65

* U.S. GOVERNMENT PRINTING OFFICE : 1967 OL—305-087 (6)

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12B	AD-656 471	5B	AD-656 550	17B	AD-656 629	9F	AD-656 707
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3B	AD-656 751	18K	LA-3671	20I	N67-31848	22A	N67-32257
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4A	AD-656 754	18A	MATT-530	20M	N67-31858	7D	N67-32267
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